

# BOOK 2 – FINANCIAL REPORTING AND ANALYSIS AND CORPORATE FINANCE

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SCHWESERNOTES™ 2011 CFA LEVEL 2 BOOK 2: FINANCIAL REPORTING AND ANALYSIS AND CORPORATE FINANCE

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# READINGS AND LEARNING OUTCOME STATEMENTS

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## READINGS

*The following material is a review of the Financial Reporting and Analysis, and Corporate Finance principles designed to address the learning outcome statements set forth by CFA Institute.*

### STUDY SESSION 5

#### Reading Assignments

*Financial Reporting and Analysis*, CFA Program Curriculum, Volume 2, Level 2  
(CFA Institute, 2011)

- |   |         |
|---|---------|
| 21. Inventories: Implications for Financial Statements and Ratios       | page 10 |
| 22. Long-lived Assets: Implications for Financial Statements and Ratios | page 34 |

### STUDY SESSION 6

#### Reading Assignments

*Financial Reporting and Analysis*, CFA Program Curriculum, Volume 2, Level 2  
(CFA Institute, 2011)

- |  |          |
|--|----------|
| 23. Intercorporate Investments                             | page 67  |
| 24. Employee Compensation: Post-Employment and Share-Based | page 101 |
| 25. Multinational Operations                               | page 128 |

### STUDY SESSION 7

#### Reading Assignments

*Financial Reporting and Analysis*, CFA Program Curriculum, Volume 2, Level 2  
(CFA Institute, 2011)

- |  |          |
|--|----------|
| 26. The Lessons We Learn                                   | page 163 |
| 27. Evaluating Financial Reporting Quality                 | page 172 |
| 28. Integration of Financial Statement Analysis Techniques | page 200 |

### STUDY SESSION 8

#### Reading Assignments

*Corporate Finance*, CFA Program Curriculum, Volume 3, Level 2  
(CFA Institute, 2011)

- |   |          |
|---|----------|
| 29. Capital Budgeting                         | page 229 |
| 30. Capital Structure                         | page 275 |
| 31. Dividends and Share Repurchases: Analysis | page 294 |

## STUDY SESSION 9

### Reading Assignments

*Corporate Finance*, CFA Program Curriculum, Volume 3, Level 2  
(CFA Institute, 2011)

- |                              |          |
|------------------------------|----------|
| 32. Corporate Governance     | page 320 |
| 33. Mergers and Acquisitions | page 336 |

### LEARNING OUTCOME STATEMENTS (LOS)

*The CFA Institute Learning Outcome Statements are listed below. These are repeated in each topic review; however, the order may have been changed in order to get a better fit with the flow of the review.*

## STUDY SESSION 5

*The topical coverage corresponds with the following CFA Institute assigned reading:*

### 21. Inventories: Implications for Financial Statements and Ratios

The candidate should be able to:

- explain and calculate the effect of inflation and deflation of inventory costs on the financial statements and ratios of companies that use different inventory valuation methods (cost formulas or cost flow assumptions). (page 10)
- discuss LIFO reserve and LIFO liquidation and their effects on financial statements and ratios. (page 15)
- demonstrate how to adjust a company's reported financial statements from LIFO to FIFO for purposes of comparison. (page 22)
- discuss the implications of valuing inventory at net realisable value for financial statements and ratios. (page 23)
- analyze and compare the financial statements and ratios of companies, including those that use different inventory valuation methods. (page 25)
- discuss issues that analysts should consider when examining a company's inventory disclosures and other sources of information. (page 27)

*The topical coverage corresponds with the following CFA Institute assigned reading:*

### 22. Long-lived Assets: Implications for Financial Statements and Ratios

The candidate should be able to:

- discuss the implications for financial statements and ratios of capitalising versus expensing costs in the period in which they are incurred. (page 34)
- discuss the implications for financial statements and ratios of the different depreciation methods for property, plant, and equipment. (page 41)
- discuss the implications for financial statements and ratios of impairment and revaluation of property, plant, and equipment, and intangible assets. (page 46)
- analyze and interpret the financial statement disclosures regarding long-lived assets. (page 49)
- discuss the implications for financial statements and ratios of leasing assets instead of purchasing assets. (page 50)
- discuss the implications for financial statements and ratios of finance leases and operating leases from the perspective of both the lessor and the lessee. (page 51)

## STUDY SESSION 6

*The topical coverage corresponds with the following CFA Institute assigned reading:*

### 23. Intercorporate Investments

The candidate should be able to:

- a. describe the classification, measurement, and disclosure under the International Financial Reporting Standards (IFRS) for 1) investments in financial assets, 2) investments in associates, 3) joint ventures, 4) business combinations, and 5) special purpose and variable interest entities (SPEs, VIEs). (page 67)
- b. distinguish between IFRS and U.S. GAAP in the classification, measurement, and disclosure of investments in financial assets, investments in associates, joint ventures, business combinations, and special purpose and variable interest entities. (page 67)
- c. analyze the effects on financial ratios of the different methods used to account for intercorporate investments. (page 87)

*The topical coverage corresponds with the following CFA Institute assigned reading:*

### 24. Employee Compensation: Post-Employment and Share-Based

The candidate should be able to:

- a. discuss the types of post-employment benefit plans and the implications for financial reports. (page 101)
- b. explain the measures of a defined benefit pension plan's liability (i.e., defined benefit obligation and projected benefit obligation). (page 102)
- c. describe the components of a company's defined benefit pension expense. (page 106)
- d. explain the impact of a defined benefit plan's assumptions on the defined benefit obligation and periodic expense. (page 108)
- e. explain the impact on financial statements of International Financial Reporting Standards (IFRS) and U.S. Generally Accepted Accounting Principles (U.S. GAAP) for pension and other post-employment benefits that permit items to be reported in the footnotes rather than in the financial statements. (page 110)
- f. evaluate pension plan footnote disclosures including cash flow related information. (page 116)
- g. evaluate the underlying economic liability (or asset) of a company's pension and other post-employment benefits. (page 116)
- h. calculate the underlying economic pension expense (income) and other postemployment expense (income) based on disclosures. (page 113)
- i. discuss the issues involved in accounting for share-based compensation. (page 117)
- j. explain the impact on financial statements of accounting for stock grants and stock options, and the importance of companies' assumptions in valuing these grants and options. (page 117)

*The topical coverage corresponds with the following CFA Institute assigned reading:*

### 25. Multinational Operations

The candidate should be able to:

- a. distinguish among presentation currency, functional currency, and local currency. (page 128)
- b. analyze the impact of changes in exchange rates on the translated sales of the subsidiary and parent company. (page 128)

- c. compare and contrast the current rate method and the temporal method, analyze and evaluate the effects of each on the parent company's balance sheet and income statement, and determine which method is appropriate in various scenarios. (page 130)
- d. calculate the translation effects, evaluate the translation of a subsidiary's balance sheet and income statement into the parent company's currency, and analyze the different effects of the current rate method and the temporal method on the subsidiary's financial ratios. (page 136)
- e. analyze how using the temporal method versus the current rate method will affect the parent company's financial ratios. (page 144)
- f. illustrate and analyze alternative accounting methods for subsidiaries operating in hyperinflationary economies. (page 148)

## STUDY SESSION 7

*The topical coverage corresponds with the following CFA Institute assigned reading:*

### 26. The Lessons We Learn

The candidate should be able to:

- a. distinguish among the various definitions of earnings (e.g., EBITDA, operating earnings, net income, etc.). (page 164)
- b. illustrate how trends in cash flow from operations can be more reliable than trends in earnings. (page 165)
- c. provide a simplified description of the accounting treatment for derivatives being used to hedge:
  - exposure to changes in the value of assets and liabilities,
  - exposure to variable cash flow, and
  - a foreign currency exposure of an instrument in a foreign corporation.(page 165)

*The topical coverage corresponds with the following CFA Institute assigned reading:*

### 27. Evaluating Financial Reporting Quality

The candidate should be able to:

- a. contrast cash-basis and accrual-basis accounting and explain why accounting discretion exists in an accrual accounting system. (page 172)
- b. describe the relation between the level of accruals and the persistence of earnings and the relative multiples that the cash and accrual components of earnings should rationally receive in valuation. (page 174)
- c. discuss the opportunities and motivations for management to intervene in the external financial reporting process and the mechanisms that discipline such intervention. (page 175)
- d. discuss earnings quality and the measures of earnings quality, and compare and contrast the earnings quality of peer companies. (page 177)
- e. explain mean reversion in earnings and how the accruals component of earnings affects the speed of mean reversion. (page 181)
- f. discuss problems with the quality of financial reporting, including revenue recognition, expense recognition, balance sheet issues, and cash flow statement issues, and interpret warning signs of these potential problems. (page 182)

*The topical coverage corresponds with the following CFA Institute assigned reading:*

## 28. Integration of Financial Statement Analysis Techniques

The candidate should be able to:

- a. demonstrate the use of a framework for the analysis of financial statements, given a particular problem, question, or purpose (e.g., valuing equity based on comparables, critiquing a credit rating, obtaining a comprehensive picture of financial leverage, evaluating the perspectives given in management's discussion of financial results). (page 200)
- b. identify financial reporting choices and biases that affect the quality and comparability of companies' financial statements and illustrate how such biases affect financial decisions. (page 201)
- c. evaluate the quality of a company's financial data and recommend appropriate adjustments to improve quality and comparability with similar companies, including adjustments for differences in accounting rules, methods, and assumptions. (page 214)
- d. predict the impact on financial statements and ratios, given a change in accounting rules, methods, or assumptions. (page 216)
- e. analyze and interpret the effects of balance sheet modifications, earnings normalization, and cash-flow-statement-related modifications on a company's financial statements, financial ratios, and overall financial condition. (page 209)

## STUDY SESSION 8

*The topical coverage corresponds with the following CFA Institute assigned reading:*

## 29. Capital Budgeting

The candidate should be able to:

- a. compute the yearly cash flows of an expansion capital project and a replacement capital project and evaluate how the choice of depreciation method affects those cash flows. (page 232)
- b. discuss the effects of inflation on capital budgeting analysis. (page 239)
- c. evaluate and select the optimal capital project in situations of 1) mutually exclusive projects with unequal lives, using either the least common multiple of lives approach or the equivalent annual annuity approach, and 2) capital rationing. (page 240)
- d. explain how sensitivity analysis, scenario analysis, and Monte Carlo simulation can be used to assess the stand-alone risk of a capital project. (page 244)
- e. discuss the procedure for determining the discount rate to be used in valuing a capital project and calculate a project's required rate of return using the capital asset pricing model (CAPM). (page 247)
- f. discuss the types of real options and evaluate a capital project using real options. (page 248)
- g. discuss common capital budgeting pitfalls. (page 251)
- h. calculate and interpret accounting income and economic income in the context of capital budgeting. (page 252)
- i. differentiate among and evaluate a capital project using the following valuation models: economic profit, residual income, and claims valuation. (page 255)

*The topical coverage corresponds with the following CFA Institute assigned reading:*

**30. Capital Structure**

The candidate should be able to:

- a. discuss the Modigliani-Miller propositions concerning capital structure, including the impact of leverage, taxes, financial distress, agency costs, and asymmetric information on a company's cost of equity, cost of capital, and optimal capital structure. (page 275)
- b. explain the target capital structure and why actual capital structure may fluctuate around the target. (page 283)
- c. review the role of debt ratings in capital structure policy. (page 283)
- d. explain the factors an analyst should consider in evaluating the impact of capital structure policy on valuation. (page 284)
- e. discuss international differences in financial leverage and the implications for investment analysis. (page 284)

*The topical coverage corresponds with the following CFA Institute assigned reading:*

**31. Dividends and Share Repurchases: Analysis**

The candidate should be able to:

- a. compare and contrast theories of dividend policy, and explain the implications of each for share value given a description of a corporate dividend action. (page 294)
- b. discuss the types of information (signals) that dividend initiations, increases, decreases, and omissions may convey. (page 295)
- c. illustrate how clientele effects and agency issues may affect a company's payout policy. (page 296)
- d. discuss the factors that affect dividend policy. (page 298)
- e. calculate and interpret the effective tax rate on a given currency unit of corporate earnings under double-taxation, split rate, and tax imputation dividend tax regimes. (page 299)
- f. compare and contrast stable dividend, target payout, and residual dividend payout policies, and calculate the dividend under each policy. (page 301)
- g. discuss the choice between paying cash dividends and repurchasing shares. (page 304)
- h. discuss global trends in corporate dividend policies. (page 307)
- i. calculate and interpret dividend coverage ratios based on 1) net income and 2) free cash flow. (page 308)
- j. discuss the symptoms of companies that may not be able to sustain their cash dividend. (page 308)

## STUDY SESSION 9

*The topical coverage corresponds with the following CFA Institute assigned reading:*

**32. Corporate Governance**

The candidate should be able to:

- a. explain corporate governance, discuss the objectives and the core attributes of an effective corporate governance system, and evaluate whether a company's corporate governance has those attributes. (page 320)
- b. compare and contrast the major business forms and describe the conflicts of interest associated with each. (page 321)



- c. discuss the conflicts that arise in agency relationships, including manager–shareholder conflicts and director–shareholder conflicts. (page 322)
- d. describe the responsibilities of the board of directors and explain the qualifications and core competencies that an investment analyst should look for in the board of directors. (page 323)
- e. illustrate effective corporate governance practice as it relates to the board of directors and evaluate the strengths and weaknesses of a company's corporate governance practice. (page 323)
- f. describe the elements of a company's statement of corporate governance policies that investment analysts should assess. (page 326)
- g. discuss the valuation implications of corporate governance. (page 327)

*The topical coverage corresponds with the following CFA Institute assigned reading:*

### **33. Mergers and Acquisitions**

The candidate should be able to:

- a. categorize merger and acquisition (M&A) activities based on forms of integration and types of mergers. (page 336)
- b. explain the common motivations behind M&A activity. (page 337)
- c. illustrate how earnings per share (EPS) bootstrapping works and calculate a company's postmerger EPS. (page 340)
- d. discuss the relation between merger motivations and types of mergers based on industry life cycles. (page 341)
- e. contrast merger transaction characteristics by form of acquisition, method of payment, and attitude of target management. (page 343)
- f. distinguish and describe pre-offer and post-offer takeover defense mechanisms. (page 346)
- g. summarize U.S. antitrust legislation. (page 349)
- h. calculate the Herfindahl–Hirschman Index and evaluate the likelihood of an antitrust challenge for a given business combination. (page 350)
- i. compare and contrast the three major methods for valuing a target company, including the advantages and disadvantages of each. (page 363)
- j. calculate free cash flows for a target company and estimate the company's intrinsic value based on discounted cash flow analysis. (page 352)
- k. estimate the intrinsic value of a company using comparable company analysis and comparable transaction analysis. (page 356)
- l. evaluate a merger bid, calculate the estimated post-merger value of an acquirer, and calculate the gains accrued to the target shareholders versus the acquirer shareholders. (page 364)
- m. explain the effects of price and payment method on the distribution of risks and benefits in a merger transaction. (page 368)
- n. describe the empirical evidence related to the distribution of benefits in a merger. (page 368)
- o. compare and contrast divestitures, equity carve-outs, spin-offs, split-offs, and liquidation. (page 369)
- p. discuss the major reasons for divestitures. (page 370)

# INVENTORIES: IMPLICATIONS FOR FINANCIAL STATEMENTS AND RATIOS

Study Session 5

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## EXAM FOCUS

This is a new topic for 2011; however, much of the material was covered in Level 1. This topic review discusses the analysis of inventory given the different cost flow methods: FIFO, LIFO, and weighted average cost. You must understand how each method affects the firm's liquidity, profitability, activity, and solvency ratios. Also, be able to make the appropriate financial statement adjustments for LIFO firms, LIFO liquidations, and inventory write-downs.

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## INVENTORY ACCOUNTING

The choice of inventory cost flow method (known as the cost flow assumption under U.S. GAAP and cost formula under IFRS) affects the firm's income statement, balance sheet, and many financial ratios. Additionally, the cost flow method can affect the firm's income taxes and, thus, the firm's cash flow.

Recall from Level 1 that cost of goods sold (COGS) is related to the beginning balance of inventory, purchases, and the ending balance of inventory.

$$\text{COGS} = \text{beginning inventory} + \text{purchases} - \text{ending inventory}$$

This can be rewritten as:

$$\text{ending inventory} = \text{beginning inventory} + \text{purchases} - \text{COGS}$$

Notice that the COGS and ending inventory are inversely related. In other words, if a particular valuation method increases the value of ending inventory, the COGS would be lower under that method.

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**LOS 21.a: Explain and calculate the effect of inflation and deflation of inventory costs on the financial statements and ratios of companies that use different inventory valuation methods (cost formulas or cost flow assumptions).**

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If the cost of inventory remains constant over time, determining the firm's COGS and ending inventory is simple. To compute COGS, simply multiply the number of units sold by the cost per unit. Similarly, to compute ending inventory, multiply the number of units remaining by the cost per unit.

However, it is likely that, over time, the cost of purchasing or producing inventory will change. As a result, firms must select a cost flow method to allocate the inventory cost to the income statement (COGS) and the balance sheet (ending inventory).

Under IFRS, the permissible methods are:

- Specific identification.
- First-in, first-out (FIFO).
- Weighted average cost.

The same cost flow methods are also allowed under U.S. GAAP. However, U.S. GAAP also permits the use of the last-in, first-out (LIFO) method. LIFO is not allowed under IFRS.



*Professor's Note: With the expected convergence of U.S. GAAP and IFRS later this decade, LIFO would no longer be permitted in the United States.*

### Specific Identification Method

Under the **specific identification method**, each unit sold is matched with the unit's actual cost. Specific identification is appropriate when inventory items are not interchangeable and is commonly used by firms with a small number of costly and easily distinguishable items, such as jewelry and automobiles. Specific identification is also appropriate for special orders or projects outside a firm's normal course of business.

### FIFO Method

Under the **FIFO method**, the first item purchased is the first item sold. The advantage of FIFO is that ending inventory is valued based on the most recent purchases, arguably the best approximation of current cost. Conversely, FIFO COGS is based on the earliest purchase costs. In an inflationary environment, COGS will be understated compared to current cost and, as a result, earnings will be overstated.

### LIFO Method

Under the **LIFO method**, the item purchased most recently is assumed to be the first item sold. In an inflationary environment, LIFO COGS will be higher than FIFO COGS, and earnings will be lower. Lower earnings translate into lower income taxes, which increase the operating cash flow. Under LIFO, ending inventory on the balance sheet is valued using the earliest costs. Therefore, in an inflationary environment, LIFO ending inventory is less than current cost.

As discussed previously, LIFO is permitted under U.S. GAAP but is not allowed under IFRS. The LIFO conformity rule of the U.S. tax code requires firms that use LIFO for tax purposes to also use LIFO for financial reporting purposes. This is one area where conformity between financial reporting and tax reporting standards is required.

The income tax advantages of using LIFO explain its popularity among U.S. firms. Because of inflation, using LIFO for tax reporting generates tax savings since LIFO

earnings are generally lower than FIFO earnings. This results in the peculiar situation where *lower reported earnings are associated with higher cash flow from operations*.

### Weighted Average Cost Method

**Weighted average cost** is a simple and objective method. The average cost per unit of inventory is computed by dividing the total cost of goods available for sale (beginning inventory + purchases) by the total quantity available for sale. To compute COGS, the average cost per unit is multiplied by the number of units sold. Similarly, to compute ending inventory, the average cost per unit is multiplied by the number of units that remain.

During inflationary or deflationary periods, the weighted average cost method will produce an inventory value between those produced by FIFO and LIFO.

**Figure 1: Inventory Cost Flow Comparison**

<i>Method</i>	<i>Assumption</i>	<i>Cost of Goods Sold Consists of...</i>	<i>Ending Inventory Consists of...</i>
FIFO (U.S. and IFRS)	The items first purchased are the first to be sold.	first purchased	most recent purchases
LIFO (U.S. only)	The items last purchased are the first to be sold.	last purchased	earliest purchases
Weighted average cost (U.S. and IFRS)	Items sold are a mix of purchases.	average cost of all items	average cost of all items

Let's look at an example of how to calculate COGS and ending inventory using the FIFO, LIFO, and weighted average cost flow methods.

#### Example: Inventory cost flow methods

Use the inventory data in the following figure to calculate the cost of goods sold and ending inventory under the FIFO, LIFO, and weighted average cost methods.

##### Inventory Data

January 1 (beginning inventory)	2 units @ \$2 per unit =	\$4
January 7 purchase	3 units @ \$3 per unit =	\$9
January 19 purchase	5 units @ \$5 per unit =	\$25
Cost of goods available	10 units	\$38
Units sold during January	7 units	

**Answer:**

*FIFO cost of goods sold.* Value the seven units sold at the unit cost of the first units purchased. Start with the earliest units purchased and work down, as illustrated in the following figure.

**FIFO COGS Calculation**

From beginning inventory	2 units @ \$2 per unit =	\$4
From first purchase	3 units @ \$3 per unit =	\$9
From second purchase	2 units @ \$5 per unit =	\$10
FIFO cost of goods sold	7 units	\$23
Ending inventory	3 units @\$5 =	\$15

*LIFO cost of goods sold.* Value the seven units sold at the unit cost of the last units purchased. Start with the most recently purchased units and work up, as illustrated in the following figure.

**LIFO COGS Calculation**

From second purchase	5 units @ \$5 per unit =	\$25
From first purchase	2 units @ \$3 per unit =	\$6
LIFO cost of goods sold	7 units	\$31
Ending inventory	2 units @\$2 + 1 unit @\$3 =	\$7

*Average cost of goods sold.* Value the seven units sold at the average unit cost of goods available.

**Weighted Average COGS Calculation**

Average unit cost	\$38 / 10 =	\$3.80 per unit
Weighted average cost of goods sold	7 units @ \$3.80 per unit =	\$26.60
Ending inventory	3 units @ \$3.80 per unit =	\$11.40

**Summary**

<i>Inventory system</i>	<i>COGS</i>	<i>Ending Inventory</i>
FIFO	\$23.00	\$15.00
LIFO	\$31.00	\$7.00
Average Cost	\$26.60	\$11.40

Note that prices and inventory levels were rising over the period and that purchases during the period were the same for all cost flow methods.

During inflationary periods and stable or increasing inventory quantities, LIFO COGS is higher than FIFO COGS. This is because the last units purchased have a higher cost than the first units purchased. Under LIFO, the more costly last units purchased are the first units sold (to COGS). Of course, higher COGS will result in lower net income.

Using similar logic, we can see that LIFO ending inventory is lower than FIFO ending inventory. Under LIFO, ending inventory is valued using older, lower costs.

During deflationary periods and stable or increasing inventory quantities, the cost flow effects of using LIFO and FIFO will be reversed; that is, LIFO COGS will be lower and LIFO ending inventory will be higher. This makes sense because the most recent lower cost purchases are sold first under LIFO, and the units in ending inventory are assumed to be the earliest purchases with higher costs.

**Figure 2: Inventory Valuation and COGS Under Different Economic Environments (Assuming Stable or Rising Inventory)**

<i>Economic Environment</i>	<i>Account</i>	<i>FIFO</i>	<i>LIFO</i>
<i>Inflationary</i>	Ending Inventory	Higher	Lower
	COGS	Lower	Higher
<i>Deflationary</i>	Ending Inventory	Lower	Higher
	COGS	Higher	Lower

### Periodic vs. Perpetual Inventory System

Firms account for changes in inventory using either a periodic or perpetual system. In a **periodic system**, inventory values and COGS are determined at the end of the accounting period. In a **perpetual system**, inventory values and COGS are updated continuously.

In the case of FIFO and specific identification, ending inventory values and COGS are the same whether a periodic or perpetual system is used. Conversely, there can be significant differences in inventory values and COGS when using weighted average cost and LIFO based on the system used.

### Ratios

Because of the effects on COGS and ending inventory, a firm's choice of inventory cost flow method can have a significant impact on profitability, liquidity, activity, and solvency. In the next section, we will discuss the adjustments necessary to compare firms with different cost flow methods.

## LOS 21.b: Discuss LIFO reserve and LIFO liquidation and their effects on financial statements and ratios.

### LIFO Reserve

When prices are changing, LIFO and FIFO can result in significant differences in ending inventories and COGS, thereby making it difficult to make comparisons across different firms. As previously discussed, there are also valuation problems with LIFO (understates inventory when prices are rising) that necessitate adjustment. Thus, for analytical and comparison purposes, it is necessary to convert the LIFO values to FIFO values.



*Professor's Note: Analysts don't typically convert from weighted average cost to FIFO because the necessary detail is not usually disclosed.*

The LIFO to FIFO conversion is relatively simple because a firm using LIFO is required to disclose the LIFO reserve in the footnotes. The LIFO reserve is the difference between LIFO inventory and FIFO inventory:

$$\text{LIFO reserve} = \text{FIFO inventory} - \text{LIFO inventory}$$

Therefore:

$$\text{FIFO inventory} = \text{LIFO inventory} + \text{LIFO reserve}$$

Figure 3 illustrates that adding the LIFO reserve to the LIFO inventory yields FIFO inventory. Remember, FIFO is always preferred from a balance sheet perspective since FIFO inventory is based on most recent costs.

**Figure 3: LIFO Reserve**



Once the LIFO inventory is converted to FIFO inventory, the accounting equation (assets = liabilities + equity) will be out of balance. To balance the equation, it is necessary to adjust cash for the difference in taxes created by the conversion and to adjust stockholders' equity by the LIFO reserve, net of tax. The income tax adjustment is necessary because the LIFO firm pays lower taxes than the FIFO firm (assuming inflation). Stated differently, had the firm been using FIFO instead of LIFO, income taxes would have been higher. So, upon conversion to FIFO, we include the taxes.

For example, say the LIFO reserve is \$150, and the tax rate is 40%. To convert the balance sheet to FIFO, increase inventory by the \$150 LIFO reserve, decrease cash by \$60 (\$150 LIFO reserve × 40% tax rate), and increase stockholders' equity (retained earnings) by \$90 [\$150 reserve × (1 – 40% tax rate)]. This will bring the accounting

equation back into balance. The net effect of the adjustments is an increase in assets and shareholders' equity of \$90, which is equal to the LIFO reserve, net of tax.



*Professor's Note: A firm's effective tax rate likely differs each year. As a result, it may be necessary to compute the income tax adjustment using a combination of rates. This concept is illustrated in a comprehensive example later in this section.*

For comparison purposes, it is also necessary to convert the LIFO firm's COGS to FIFO COGS. The difference between LIFO COGS and FIFO COGS is equal to the *change* in the LIFO reserve for the period. So, to convert COGS from LIFO to FIFO, simply subtract the change in the LIFO reserve:

$$\text{FIFO COGS} = \text{LIFO COGS} - (\text{ending LIFO reserve} - \text{beginning LIFO reserve})$$

Assuming inflation, FIFO COGS is lower than LIFO COGS, so subtracting the change in the **LIFO reserve** (the difference in COGS under the two methods) from LIFO COGS makes intuitive sense. When prices are falling, we still subtract the change in the LIFO reserve to convert from LIFO COGS to FIFO COGS. In this case, however, the change in the LIFO reserve is negative and subtracting it will result in higher COGS. This again makes sense. When prices are falling, FIFO COGS are greater than LIFO COGS.



*Professor's Note: Ideally, we would prefer to convert from FIFO COGS to LIFO COGS for analytical purposes. LIFO COGS is a better representation of economic costs since it is based on the most recent purchases. However, the FIFO to LIFO conversion of COGS is beyond the scope of this topic review.*

#### Example: Converting ending inventory and COGS from LIFO to FIFO

Sipowitz Company, which uses LIFO, reported end-of-year inventory balances of \$500 in 20X5 and \$700 in 20X6. The LIFO reserve was \$200 for 20X5 and \$300 for 20X6. COGS during 20X6 was \$3,000. Convert 20X6 ending inventory and COGS to a FIFO basis.

#### Answer:

Inventory:

$$\text{Inv}_F = \text{Inv}_L + \text{LIFO reserve} = \$700 + \$300 = \$1,000$$

COGS:

$$\begin{aligned} \text{COGS}_F &= \text{COGS}_L - (\text{ending LIFO reserve} - \text{beginning LIFO reserve}) \\ &= \$3,000 - (\$300 - \$200) = \$2,900 \end{aligned}$$



Let's take a look at a more comprehensive example.

### Example: Converting from LIFO to FIFO

Viper Corp. is a high-performance bicycle manufacturer. Viper's balance sheets for 20X5 and 20X6 and an income statement for 20X6 are as shown. The balance sheets and income statement were prepared using LIFO. Calculate the current ratio, inventory turnover, long-term debt-to-equity ratio, gross profit margin, net profit margin, and return on assets ratio for 20X6 for both LIFO and FIFO inventory cost flow methods.

#### Viper Balance Sheet

(Prepared using LIFO)	20X6	20X5
Assets		
Cash	\$115	\$95
Receivables	205	195
Inventories	310	290
Total current assets	\$630	\$580
Gross plant and equipment	\$1,800	\$1,700
Accumulated depreciation	360	340
Net plant and equipment	\$1,440	\$1,360
Total assets	\$2,070	\$1,940
Liabilities and equity		
Payables	\$110	\$90
Short-term debt	215	185
Current liabilities	\$325	\$275
Long-term debt	715	785
Common stock	300	300
Additional paid-in-capital	400	400
Retained earnings	330	180
Total liabilities and equity	\$2,070	\$1,940

**Viper Income Statement**

(Prepared using LIFO)	20X6
Revenue	\$4,000
Cost of goods sold	3,000
Gross profit	\$1,000
Operating expenses	650
Operating profit	350
Interest expense	50
Earnings before tax	300
Taxes	90
Net income	210
Common dividends	\$60

Inventory footnote: The company uses the LIFO inventory cost flow method. Had FIFO been used, inventories would have been \$100 higher in 20X6 and \$90 higher in 20X5.

Income tax footnote: The effective tax rate for 20X6 was 30%. For all other years, the effective tax rate was 20%.

**Answer:**

***Current ratio***

The current ratio (current assets / current liabilities) under LIFO is  $\$630 / \$325 = 1.9$ .

To convert to FIFO, the 20X6 LIFO reserve of \$100 is added to current assets (inventory) and income taxes on the LIFO reserve of \$21 are subtracted from cash. The income taxes on the 20X6 LIFO reserve are calculated at a blended rate as follows:

20% rate	\$18	(\$90 20X5 reserve × 20%)
30% rate	3	(\$100 20X6 reserve – \$90 20X5 reserve) × 30%
Taxes on 20X6 reserve	\$21	

Thus, under FIFO, the current ratio is  $(\$630 + \$100 \text{ LIFO reserve} - \$21 \text{ taxes}) / \$325 = 2.2$ . The current ratio is higher under FIFO as ending inventory now approximates current cost.

*Inventory turnover*

The inventory turnover ratio (COGS / average inventory) under LIFO is  $\$3,000 / \$300 = 10.0$ .

To convert to FIFO COGS, it is necessary to subtract the change in the LIFO reserve from LIFO COGS. The change in the LIFO reserve is  $\$100 \text{ ending reserve} - \$90 \text{ beginning reserve} = \$10$ .

To convert LIFO average inventory to FIFO, the average LIFO reserve is added to average LIFO inventory:  $(\$90 \text{ beginning reserve} + \$100 \text{ ending reserve}) / 2 = \$95$ . Alternatively, we can calculate average FIFO inventory by averaging the beginning and ending FIFO inventory:  $(\$290 \text{ beginning LIFO inventory} + \$90 \text{ beginning LIFO reserve} + \$310 \text{ ending LIFO inventory} + \$100 \text{ ending LIFO reserve}) / 2 = \$395$ .

Thus, under FIFO, inventory turnover is  $(\$3,000 - 10 \text{ change in LIFO reserve}) / (\$300 + \$95 \text{ average LIFO reserve}) = 7.6$ . Inventory turnover is lower under FIFO due to higher average inventory in the denominator and lower COGS in the numerator (assuming inflation).

*Long-term debt-to-equity ratio*

The long-term debt-to-equity ratio (long-term debt / stockholders' equity) under LIFO is  $\$715 / \$1,030 = 0.6942$ .

To convert to FIFO, the 20X6 LIFO reserve, net of tax, is added to stockholders' equity. The adjustment to stockholders' equity is necessary to make the accounting equation balance. The 20X6 LIFO reserve of \$100 was added to inventory and \$21 of income taxes was subtracted from cash, so the difference of \$79 is added to stockholders' equity.

Thus, under FIFO, long-term debt-to-equity is  $\$715 / (\$1,030 + \$79 \text{ ending LIFO reserve, net of tax}) = 0.6447$ . Long-term debt-to-equity is lower under FIFO (assuming inflation) because stockholders' equity is higher, since it reflects the effects of bringing the LIFO reserve onto the balance sheet.

*Gross profit margin*

The gross profit margin (gross profit / revenue) under LIFO is  $\$1,000 / \$4,000 = 25.0\%$ .

To convert to FIFO gross profit margin, the \$10 change in the LIFO reserve is subtracted from LIFO COGS. Thus, under FIFO, gross profit margin is  $(\$1,000 + \$10 \text{ change in LIFO reserve}) / \$4,000 = 25.3\%$ . Gross profit margin is higher under FIFO because COGS is lower under FIFO.

*Net profit margin*

The net profit margin (net income / revenue) under LIFO is  $\$210 / \$4,000 = 5.3\%$ .

To convert to FIFO net profit margin, subtract the \$10 change in the LIFO reserve from LIFO COGS to get FIFO COGS and increase income taxes \$3 (\$10 increase in reserve  $\times$  30% tax rate). The increase in income taxes is the result of applying the 20X6 tax rate to the increase in taxable profit (lower COGS).

Thus, under FIFO, net profit margin is  $(\$210 + \$10 \text{ change in LIFO reserve} - \$3 \text{ taxes}) / \$4,000 = 5.4\%$ . The net profit margin is greater under FIFO because COGS is less under FIFO (assuming inflation).



*Professor's Note: We did not recognize the entire tax effect of the 20X6 LIFO reserve in the 20X6 income statement. The change from LIFO to FIFO is handled retrospectively. In other words, had we been using FIFO all along, the resulting higher taxes would have already been recognized in the previous years' income statements.*

*Return on assets*

Return on assets (net income / average assets) under LIFO is  $\$210 / \$2,005 = 10.5\%$ .

To convert to FIFO return on assets, LIFO net income is increased by the change in the LIFO reserve, net of tax. Thus, FIFO net income is equal to  $\$210 + \$10 \text{ change in reserve} - \$3 \text{ taxes} = \$217$ .

To convert LIFO average assets, add the beginning and ending LIFO reserves, net of tax, to total assets. Thus, FIFO average assets is equal to  $(\$2,070 \text{ 20X6 assets} + \$79 \text{ 20X6 reserve, net of tax} + \$1,940 \text{ 20X5 assets} + \$72 \text{ 20X5 reserve, net of tax}) / 2 = \$2,081$ .

Thus, the FIFO return on assets is  $\$217 / \$2,081 = 10.4\%$ . In this example, the firm is slightly less profitable under FIFO because the increase in FIFO net income is more than offset by the increase in FIFO average assets. This is not always the case.

**LIFO Liquidation**

Recall that the LIFO reserve is equal to the difference between LIFO inventory and FIFO inventory. The LIFO reserve will increase when prices are rising and inventory quantities are stable or increasing. If the firm is liquidating its inventory, or if prices are falling, the LIFO reserve will decline.

A **LIFO liquidation** occurs when a LIFO firm's inventory quantities are declining. In this situation, the older, lower costs are now included in COGS. The result is higher profit margins and higher income taxes. Note, however, that the higher profit is artificial (phantom) because it is not sustainable. The firm cannot liquidate its inventory

indefinitely because it will eventually run out of goods to sell. You can think of a LIFO liquidation as finally recognizing previously unrecognized inventory gains in the income statement.

Obviously, firms can deliberately increase earnings by simply liquidating the older, lower cost inventory and not replacing the inventory. However, LIFO liquidations can also result from strikes, recessions, or declining demand from customers.

The analyst should adjust COGS for the decline in the LIFO reserve caused by a decline in inventory. Firms must disclose a LIFO liquidation in the financial statement footnotes to facilitate the adjustment.

### Example: LIFO liquidation

At the beginning of 20X8, Big 4 Manufacturing Company had 560 units of inventory as follows:

<i>Year Purchased</i>	<i>Number of Units</i>	<i>Cost Per Unit</i>	<i>Total Cost</i>
20X4	120	\$10	\$1,200
20X5	140	11	1,540
20X6	140	12	1,680
20X7	<u>160</u>	13	<u>2,080</u>
	560		\$6,500

Due to a strike, no units were produced during 20X8. During 20X8, Big 4 sold 440 units. In the absence of the strike, Big 4 would have had a cost of \$14 for each unit produced. Compute the artificial (phantom) profit that resulted from the liquidation of inventory.

### Answer:

Because of the LIFO liquidation, actual COGS was \$5,300 as follows:

	<u>Units</u>	<u>Cost</u>	
Beginning Inventory	560	\$6,500	
+ Purchases	-0-	-0-	
– Ending Inventory	<u>120</u>	<u>1,200</u>	(\$10 × 120 units)
= COGS (Actual)	440	\$5,300	

Had Big 4 replaced the 440 units sold, COGS would have been \$6,160 as follows:

	<u>Units</u>	<u>Cost</u>	
Beginning Inventory	560	\$6,500	
+ Purchases	440	6,160	(\$14 × 440 units)
– Ending Inventory	<u>560</u>	<u>6,500</u>	
= COGS (If replaced)	440	\$6,160	

Due to the LIFO liquidation, COGS was lower by \$860 (\$6,160 – \$5,300); thus, pretax profit was higher by \$860. The higher profit is unsustainable because Big 4 will eventually run out of inventory.

### LOS 21.c: Demonstrate how to adjust a company's reported financial statements from LIFO to FIFO for purposes of comparison.

Because of the different inventory cost flow choices, analysts may need to make adjustments for comparative purposes. In addition, analysts may need to make adjustments in advance of an anticipated change in inventory method. For example, if U.S. firms adopt IFRS as expected, LIFO inventory accounting will disappear.

The adjustments for comparative purposes are generally made retrospectively. This means the prior year financial statements are recast based on the new cost flow method. The cumulative effect of the change is reported as an adjustment to the beginning retained earnings of the earliest year presented.

For example, returning to our earlier LIFO adjustment example, the analyst would recast the financial statements assuming FIFO for comparison purposes as follows:

#### Viper Balance Sheet

(Adjusted from LIFO to FIFO)	20X6	20X5
Assets		
Cash <sup>1</sup>	\$94	\$77
Receivables	205	195
Inventories <sup>2</sup>	410	380
Total current assets	\$709	\$652
Gross plant and equipment	\$1,800	\$1,700
Accumulated depreciation	360	340
Net plant and equipment	\$1,440	\$1,360
Total assets	\$2,149	\$2,012
Liabilities and equity		
Payables	\$110	\$90
Short-term debt	215	185
Current liabilities	\$325	\$275
Long-term debt	715	785
Common stock	300	300
Additional paid-in-capital	400	400
Retained earnings <sup>3</sup>	409	252
Total liabilities and equity	\$2,149	\$2,012

<sup>1</sup> Subtract taxes on LIFO reserve of \$21 and \$18 for 20X6 and 20X5, respectively.

<sup>2</sup> Add LIFO reserve of \$100 and \$90 for 20X6 and 20X5, respectively.

<sup>3</sup> Add LIFO reserve (net of tax) of \$79 and \$72 for 20X6 and 20X5, respectively.

**Viper Income Statement**

(Adjusted from LIFO to FIFO)	20X6
Revenue	\$4,000
Cost of goods sold <sup>4</sup>	2,990
Gross profit	\$1,010
Operating expenses	650
Operating profit	360
Interest expense	50
Earnings before tax	310
Taxes <sup>5</sup>	93
Net income	217
Common dividends	\$60

<sup>4</sup> Subtract \$10 change in reserve for 20X6.

<sup>5</sup> Add \$3 taxes on change in the reserve for 20X6.

The effects of the adjustments confirm our understanding of the differences in LIFO and FIFO. Under FIFO, inventory is higher because the higher cost units remain on the balance sheet. Higher inventory results in higher current assets and higher total assets. The increase in current assets and total assets is partially offset by the higher taxes.

The adjustment to COGS also confirms our understanding. FIFO COGS is lower as compared to LIFO (assuming inflation) because under FIFO the lower cost units are sold first. Lower COGS results in higher net income.

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**LOS 21.d: Discuss the implications of valuing inventory at net realisable value for financial statements and ratios.**


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The **inventory cost flow method** should not be confused with the **inventory valuation method**. The valuation method is used in determining the carrying value on the balance sheet and in testing inventory for impairment.

Under IFRS, inventory is reported on the balance sheet at the lower of cost or **net realizable value**. Net realizable value is equal to the estimated sales price less the estimated selling costs and completion costs. If net realizable value is less than the balance sheet cost, the inventory is “written down” to net realizable value and a loss is recognized in the income statement. If there is a subsequent recovery in value, the inventory can be “written up” and a gain is recognized in the income statement. However, the amount of any such gain is limited to the amount previously recognized as a loss. In other words, inventory cannot be reported on the balance sheet at an amount that exceeds original cost.

Under U.S. GAAP, inventory is reported on the balance sheet at the lower of cost or market. **Market** is usually equal to **replacement cost**; however, market cannot be greater than net realizable value (NRV) or less than NRV minus a normal profit margin. If replacement cost exceeds NRV, then market is NRV. If replacement cost is less than NRV minus a normal profit margin, then market is NRV minus a normal profit margin.



*Professor's Note: Think of lower of cost or market, where "market" cannot be outside a range of values. The range is from net realizable value minus a normal profit margin to net realizable value. So the size of the range is the normal profit margin. "Net" means sales price less selling and completion costs.*

If cost exceeds market, the inventory is "written down" to market on the balance sheet and a loss is recognized in the income statement. If there is a subsequent recovery in value, no "write-up" is allowed under U.S. GAAP. In this case, the market value becomes the new cost basis.

#### Example: Inventory writedown

Zoom, Inc. sells digital cameras. Per-unit cost information pertaining to Zoom's inventory is as follows:

Original cost	\$210
Estimated selling price	\$225
Estimated selling costs	\$22
Net realizable value	\$203
Replacement cost	\$197
Normal profit margin	\$12

What are the per-unit carrying values of Zoom's inventory under IFRS and under U.S. GAAP?

#### Answer:

Under IFRS, inventory is reported on the balance sheet at the lower of cost or net realizable value. Since original cost of \$210 exceeds net realizable value ( $\$225 - \$22 = \$203$ ), the inventory is written down to the net realizable value of \$203 and a \$7 loss ( $\$203$  net realizable value – \$210 original cost) is reported in the income statement.

Under U.S. GAAP, inventory is reported at the lower of cost or market. In this case, market is equal to replacement cost of \$197, since net realizable value of \$203 is greater than replacement cost, and net realizable value minus a normal profit margin ( $\$203 - \$12 = \$191$ ) is less than replacement cost. Since original cost exceeds market (replacement cost), the inventory is written down to \$197 and a \$13 loss ( $\$197$  replacement cost – \$210 original cost) is reported in the income statement.

#### Example: Inventory write-up

Assume that in the year after the writedown in the previous example, net realizable value and replacement cost both increase by \$10. What is the impact of the recovery under IFRS and under U.S. GAAP?



**Answer:**

Under IFRS, Zoom will write up inventory to \$210 per unit and recognize a \$7 gain in its income statement. The write-up (gain) is limited to the original writedown of \$7. The carrying value cannot exceed original cost.

Under U.S. GAAP, no write-up is allowed. The per-unit carrying value will remain at \$197. Zoom will simply recognize higher profit when the inventory is sold.

Recall that LIFO ending inventory is based on older, lower costs (assuming inflation) as compared to FIFO. Since cost is the basis of determining whether an impairment has occurred, LIFO firms are less likely to recognize inventory write-downs as compared to firms using FIFO or weighted average cost.

Analysts must be aware of how an inventory write-down, or write-up, affects a firm's ratios. For example, the write-down may significantly impact inventory turnover in the current and future periods. Thus, comparability with previous periods may be an issue.

Reporting inventory above historical cost is permitted under IFRS and U.S. GAAP in certain industries. This exception applies mainly to producers and dealers of commodity-like products, such as agricultural and forest products, mineral ores, and precious metals. Under this exception, inventory is reported at net realizable value, and the unrealized gains and losses from changing market prices are recognized in the income statement. If an active market exists for the commodity, the quoted market price is used to value the inventory. Otherwise, recent market transactions are used.

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**LOS 21.e: Analyze and compare the financial statements and ratios of companies, including those that use different inventory valuation methods.**

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The differences in LIFO and FIFO can be summarized in Figure 4.

**Figure 4: LIFO and FIFO Comparison—Assuming Inflation and Stable or Increasing Quantities**

<i>LIFO results in...</i>	<i>FIFO results in...</i>
higher COGS	lower COGS
lower taxes	higher taxes
lower net income (EBT and EAT)	higher net income (EBT and EAT)
lower inventory balances	higher inventory balances
lower working capital (CA – CL)	higher working capital (CA – CL)
higher cash flows (less taxes paid out)	lower cash flows (more taxes paid out)
lower net and gross margins	higher net and gross margins
lower current ratio	higher current ratio
higher inventory turnover	lower inventory turnover
higher debt-to-equity	lower debt-to-equity

A firm's choice of inventory cost flow method can have a significant impact on profitability, liquidity, activity, and solvency.



*Professor's Note: The presumption in this section is that prices are rising and inventory quantities are stable or increasing.*

### *Profitability*

As compared to FIFO, LIFO produces higher COGS in the income statement and will result in lower earnings. Any profitability measure that includes COGS will be lower under LIFO. For example, higher COGS will result in lower gross, operating, and net profit margins as compared to FIFO.

### *Liquidity*

As compared to FIFO, LIFO results in a lower inventory value on the balance sheet. Since inventory (a current asset) is lower under LIFO, the current ratio, a popular measure of liquidity, is also lower under LIFO than under FIFO. Working capital is lower under LIFO as well, because current assets are lower.

The quick ratio is unaffected by the firm's inventory cost flow method since inventory is excluded from its numerator.

### *Activity*

Inventory turnover ( $\text{COGS} / \text{average inventory}$ ) is higher for firms that use LIFO compared to firms that use FIFO. Under LIFO, COGS is valued at more recent, higher costs (higher numerator), while inventory is valued at older, lower costs (lower denominator). Higher turnover under LIFO will result in lower days' of inventory on hand ( $365 / \text{inventory turnover}$ ).

### *Solvency*

LIFO results in lower total assets compared to FIFO, since LIFO inventory is lower. Lower total assets under LIFO result in lower stockholders' equity (assets – liabilities). Since total assets and stockholders' equity are lower under LIFO, the debt ratio and the debt-to-equity ratio are higher under LIFO compared to FIFO.



*Professor's Note: Another way of thinking about the impact of LIFO on stockholders' equity is that because LIFO COGS is higher, net income is lower. Lower net income will result in lower stockholders' equity (retained earnings) compared to FIFO stockholders' equity.*

Let's return to the earlier LIFO adjustment example. For comparison purposes, the following table summarizes our findings. Note the results of Viper's peer group have been included for analytical purposes.

Figure 5: Ratio Analysis

Year ended 20X6	Viper		Peer Group
	LIFO	FIFO	FIFO
Current ratio	1.9	2.2	1.7
Inventory turnover	10.0	7.6	9.8
Long-term debt-to-equity	0.7	0.6	0.6
Gross profit margin	25.0%	25.3%	32.1%
Net profit margin	5.3%	5.4%	6.5%
Return on assets	10.5%	10.4%	11.2%

**Liquidity:** The after-tax LIFO adjustment resulted in an increase in Viper's current ratio. The adjusted ratio exceeds the peer group indicating greater liquidity. Since inventory is the largest component of Viper's current assets, additional analysis is needed.

**Activity:** Viper's adjusted inventory turnover declined as expected due to the decrease in COGS and the increase in average inventory. Adjusted inventory turnover is less than the peer group, which indicates that it takes Viper longer to sell its goods. In terms of inventory days ( $365 / \text{inventory turnover}$ ), Viper has 48.0 days of inventory on hand while the peer group has 37.2 days on hand. Too much inventory is costly and can also be an indication of obsolescence.

**Solvency:** Viper's adjusted long-term debt-to-equity ratio of 0.6 is in line with the peer group.

**Profitability:** As expected, Viper's adjusted gross profit and net profit margin ratios increased because COGS is lower under FIFO. However, the adjusted margin ratios are significantly less than the peer group's ratios. Coupled with lower adjusted inventory turnover, Viper's lower gross profit margin may be an indication that Viper is lowering sales prices to move its inventory. This is another indication that some of Viper's inventory may be obsolete. As previously discussed, obsolete (impaired) inventory must be written-down.

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#### LOS 21.f: Discuss issues that analysts should consider when examining a company's inventory disclosures and other sources of information.

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Merchandising firms, such as wholesalers and retailers, purchase inventory that is ready for sale. In this case, inventory is reported in one account on the balance sheet. On the other hand, manufacturing firms normally report inventory using three separate accounts: raw materials, work-in-process, and finished goods. Analysts can use these disclosures, along with other sources of information, such as Management's Discussion and Analysis, as a signal of a firm's future revenues and earnings.

For example, an increase in raw materials and/or work-in-process inventory may be an indication of an expected increase in demand. Higher demand should result in higher revenues and earnings. Conversely, an increase in finished goods inventory, while raw materials and work-in-process are decreasing, may be an indication of decreasing demand.

Analysts should also examine the relationship between sales and finished goods. Finished goods inventory that is growing faster than sales may be an indication of declining demand and, ultimately, excessive or potentially obsolete inventory. Obsolete inventory will result in lower earnings in the future as the inventory is written-down. In addition, too much inventory is costly as the firm incurs storage costs, insurance, and inventory taxes. Too much inventory also uses cash that might be more efficiently used somewhere else.

## KEY CONCEPTS

### LOS 21.a

Inventory cost flow methods:

- FIFO: The cost of the first item purchased is the cost of the first item sold. Ending inventory is based on the cost of the most recent purchases, thereby approximating current cost.
- LIFO: The cost of the last item purchased is the cost of the first item sold. Ending inventory is based on the cost of the earliest items purchased. Assuming inflation, ending inventory is smaller and COGS is larger compared to those calculated using FIFO. Higher COGS results in lower taxes and, thus, higher cash flow. LIFO is prohibited under IFRS.
- Weighted average cost: COGS and inventory values are between their FIFO and LIFO values.
- Specific identification: Each unit sold is matched with the unit's actual cost.

### LOS 21.b

The LIFO reserve is the difference in LIFO ending inventory and FIFO ending inventory. It is used to adjust the LIFO firm's ending inventory and COGS back to FIFO for comparison purposes.

A LIFO liquidation occurs when a firm sells more inventory than it replaces. The result is lower COGS and higher profit. However, the increase in profit is not sustainable once the current inventory is depleted.

### LOS 21.c

To adjust a LIFO firm's financial statements to reflect the FIFO cost flow method:

- Add the LIFO reserve to current assets (ending inventory).
- Subtract the income taxes on the LIFO reserve from current assets (cash).
- Add the LIFO reserve, net of tax, to shareholders' equity.
- Subtract the *change* in the LIFO reserve from COGS.
- Add the income taxes on the *change* in the LIFO reserve to income tax expense.

### LOS 21.d

Under IFRS, inventories are valued at the lower of cost or net realizable value. Inventory "write-ups" are allowed, but only to the extent that a previous write-down to net realizable value was recorded.

Under U.S. GAAP, inventories are valued at the lower of cost or market. Market is usually equal to replacement cost but cannot exceed net realizable value or be less than net realizable value minus a normal profit margin. No subsequent "write-up" is allowed.

**LOS 21.e**

Assuming inflation and stable or increasing inventory quantities:

*LIFO results in...*

higher COGS  
 lower taxes  
 lower net income  
 lower inventory balances  
 lower working capital  
 higher cash flows (less taxes)  
 lower net and gross margins  
 lower current ratio  
 higher inventory turnover  
 higher debt-to-equity

*FIFO results in...*

lower COGS  
 higher taxes  
 higher net income  
 higher inventory balances  
 higher working capital  
 lower cash flows (more taxes)  
 higher net and gross margins  
 higher current ratio  
 lower inventory turnover  
 lower debt-to-equity

**LOS 21.f**

An increase in raw materials and/or work-in-process inventory may be an indication of an expected increase in demand. Conversely, an increase in finished goods inventory, while raw materials and work-in-process are decreasing, may be an indication of decreasing demand.

Finished goods inventory that is growing faster than sales may be an indication of declining demand and, ultimately, excessive and potentially obsolete inventory.

## CONCEPT CHECKERS

1. During the month of May, a firm's inventory account included the following transactions:

May 1	Inventory	25 units @ \$4.00
12	Purchased	60 units @ \$4.40
29	Purchased	30 units @ \$4.20
	Sold	80 units @ \$6.00

Assuming periodic LIFO inventory pricing, gross profit for May was:

- A. \$132.  
B. \$134.  
C. \$138.
2. In an inflationary environment, a LIFO liquidation will *most likely* result in an increase in:
- A. operating profit margin.  
B. inventory.  
C. accounts payable.
3. A LIFO firm reports the following:
- Net income \$125,000.
  - Beginning inventory \$25,000.
  - Ending inventory \$27,000.
  - Beginning LIFO reserve \$12,000.
  - Ending LIFO reserve \$15,000.
  - Effective tax rate 40%.
- Had the firm used FIFO to account for its inventory, its net income would have been:
- A. \$123,000.  
B. \$126,200.  
C. \$126,800.
4. Kamp, Inc., sells specialized bicycle shoes. At year-end, due to a sudden increase in manufacturing costs, the replacement cost per pair of shoes is \$55. The original cost is \$43, and the current selling price is \$50. The normal profit margin is 10% of the selling price, and the selling costs are \$3 per pair. According to U.S. GAAP, which of the following amounts should each pair of shoes be reported on Kamp's year-end balance sheet?
- A. \$42.  
B. \$43.  
C. \$47.

5. All else equal, in periods of rising prices and stable inventory levels, which of the following statements is *most accurate*?
  - A. FIFO firms have higher cash flow from operations than otherwise identical LIFO firms.
  - B. LIFO firms have higher gross profit margins than otherwise identical FIFO firms.
  - C. FIFO firms have higher stockholders' equity than otherwise identical LIFO firms.
6. Which of the following would *most likely* signal an increase in higher profits in the future?
  - A. An increase in raw materials and work-in-process inventories in the current period.
  - B. A decrease in work-in-process inventory and an increase in finished goods in the current period.
  - C. Inventory growth that currently exceeds sales growth.



## ANSWERS – CONCEPT CHECKERS

1. **B** Under LIFO, the last units purchased are the first units sold.

Revenue	\$480 (80 units × \$6.00)
COGS	<u>346</u> (30 units × \$4.20) + (50 units × \$4.40)
Gross Profit	\$134

2. **A** In a LIFO liquidation, the older, lower, costs are penetrated; thus, per unit COGS declines and profit margins increase.
3. **C** FIFO net income = LIFO net income + [(ending reserve – beginning reserve) × (1 – tax rate)] = \$125,000 + [(15,000 – 12,000) × 60%] = \$126,800
4. **B** Market is equal to the replacement cost as long as replacement cost is within a specific range. The upper bound is net realizable value (NRV), which is equal to the selling price (\$50) less selling costs (\$3) for a NRV of \$47. The lower bound is NRV (\$47) less normal profit margin (10% of selling price = \$5) for a net amount of \$42. Since replacement cost is greater than NRV (\$47), market equals NRV (\$47). Additionally, we have to use the lower of cost (\$43) or market (\$47) principle, so the shoes should be recorded at cost of \$43.
5. **C** All else equal, the FIFO firm has higher assets due to higher inventory. Since liabilities are assumed to be equal, the FIFO firm must have higher equity to finance those assets.
6. **A** An increase in raw materials inventory may be an indication of an expected increase in demand. Higher demand should result in higher revenues and earnings.

# LONG-LIVED ASSETS: IMPLICATIONS FOR FINANCIAL STATEMENTS AND RATIOS

Study Session 5

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## EXAM FOCUS

This is a new topic for 2011; however, much of the material was covered in Level 1. Firms make many choices in accounting for long-lived assets that impact the firms' profitability, trends, ratios, and cash flow classifications. You must understand the effects and issues of capitalizing versus expensing various expenditures including construction interest and research and development. For capitalized costs, you must be familiar with the effects of the different depreciation methods and be able to determine if an asset is impaired. Finally, you must thoroughly understand how the classification of a lease as either an operating or finance lease affects the balance sheet, income statement, and cash flow statement of both the lessee and the lessor.

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### LOS 22.a: Discuss the implications for financial statements and ratios of capitalising versus expensing costs in the period in which they are incurred.

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When a firm makes an expenditure, it can either capitalize the cost as an asset on the balance sheet or expense the cost in the income statement in the period incurred. As a general rule, an expenditure that is expected to provide a future economic benefit over multiple accounting periods is **capitalized**; but if the future economic benefit is unlikely or highly uncertain, the expenditure is **expensed**.

An expenditure that is capitalized is initially recorded on the balance sheet at cost, presumably its fair value at acquisition, plus any costs necessary to prepare the asset for use. Except for land and intangible assets with indefinite lives (such as acquisition goodwill), the cost is then allocated to the income statement over the life of the asset as depreciation expense (for tangible assets) or amortization expense (for intangible assets with finite lives).

Alternatively, if an expenditure is expensed, current period net income is reduced by the after-tax amount of the expenditure.

Although it may make no operational difference, the choice between capitalizing and expensing will affect net income, shareholders' equity, total assets, cash flow from operations, cash flow from investing, and numerous financial ratios.

## Net Income

Capitalizing an expenditure delays the recognition of expense in the income statement. Thus, in the period that an expenditure is capitalized, the firm will report higher net

income compared to expensing. In subsequent periods, the firm will report lower net income compared to expensing, as the capitalized expenditure is allocated to the income statement through the depreciation or amortization expense. This allocation process reduces the variability of net income by spreading the expense over time.



*Professor's Note: For firms in an expansion phase, capitalizing expenditures may result in earnings that are higher over many periods compared to an expensing firm because the amount of depreciation from previously capitalized expenditures is less than the amount of additional costs that are being newly capitalized.*

Conversely, if a firm expenses an expenditure in the current period, net income is reduced by the after-tax amount of the expenditure. In subsequent periods, no allocation of cost is necessary; thus, net income in future periods is higher than if the expenditure was capitalized.

Over the life of an asset, *total* net income will be identical. Timing of the expense recognition in the income statement is the only difference.

## Shareholders' Equity

Because capitalization results in higher net income in the period of the expenditure as compared to expensing, it also results in higher shareholders' equity (retained earnings). As the cost is allocated to the income statement in subsequent periods, net income will be reduced along with shareholders' equity (retained earnings). Total assets are higher with capitalization, and liabilities are unaffected, so the accounting equation ( $A = L + E$ ) remains balanced.

If the expenditure is expensed, shareholders' equity (retained earnings) will reflect the entire reduction in net income in the period of the expenditure.

## Cash Flow From Operations

A capitalized expenditure is usually reported in the cash flow statement as an outflow from investing activities. If expensed, the expenditure is reported as an outflow from operating activities. Thus, capitalizing an expenditure will result in higher operating cash flow and lower investing cash flow as compared to expensing. Assuming no differences in tax treatment, *total* cash flow will be exactly the same. The classification of the cash flow is the only difference.

Recall that when an expenditure is capitalized, depreciation expense is recognized in subsequent periods. Depreciation is a noncash expense and, aside from any tax effects, does not affect operating cash flow.

## Financial Ratios

Capitalizing an expenditure results in higher assets and higher equity compared to expensing. Thus, both the debt-to-assets ratio and the debt-to-equity ratio are lower (they have larger denominators) with capitalization.

Capitalizing an expenditure will *initially* result in higher return on assets (ROA) and higher return on equity (ROE). This is the result of higher net income in the first year. In subsequent years, ROA and ROE will be lower for the capitalizing firm as net income is reduced by the depreciation expense.

Since the expensing firm recognizes the entire expense in the first year, ROA and ROE will be lower in the first year and higher in the subsequent years. After the first year, net income (numerator) is higher, and assets and equity (denominators) are lower, than they would be if the firm had capitalized the expenditure. Analysts must be careful when comparing firms because expensing an expenditure gives the appearance of growth after the first year.

## Capitalized Interest

When a firm constructs an asset for its own use or, in limited circumstances, for resale, the interest that accrues during the construction period is capitalized as a part of the asset's cost. The objective of capitalizing interest is to accurately measure the cost of the asset and to better match the cost with the revenues generated by the constructed asset. The treatment of capitalizing interest is similar under U.S. GAAP and IFRS.

The interest rate used to capitalize interest is based on debt specifically related to the construction of the asset. If no construction debt is outstanding, the interest rate is based on existing unrelated borrowings. Interest costs on general corporate debt in excess of project construction costs are expensed.

Capitalized interest is not reported in the income statement as interest expense. Once construction interest is capitalized, the interest cost is allocated to the income statement through depreciation expense (if the asset is held for use), or COGS (if the asset is held for sale).

Generally, capitalized interest is reported in the cash flow statement as an outflow from investing activities, while interest expense is reported as an outflow from operating activities.

## Interest Coverage Ratio

The **interest coverage ratio** ( $\text{EBIT} / \text{interest expense}$ ) measures a firm's ability to make required interest payments on its debt.

In the year of the expenditure, capitalizing results in lower interest expense and higher net income compared to expensing. The result is a higher interest coverage ratio (smaller denominator) when interest is capitalized.

In subsequent periods, the capitalized interest is allocated to the income statement as depreciation expense, not interest expense. Higher depreciation expense results in lower EBIT. Thus, in subsequent periods, the capitalized interest results in a lower interest coverage ratio (smaller numerator).

### Implications for Analysis

An analyst may want to reverse the effect of capitalized interest and restate the financial statements and related ratios. Many analysts consider interest coverage ratios based on total interest expense (including capitalized interest) as a better measure of the solvency of the firm, since the interest is a required payment. Bond rating agencies often make this adjustment. When there are debt covenants (provisions of the borrowing agreement) that specify a minimum interest coverage ratio, analysts should be aware of how the ratio is calculated in determining whether the covenant has been violated (which can mean immediate repayment is required). If the requirement is that the interest coverage ratio be calculated with capitalized interest included in interest expense, the analyst must adjust the ratio accordingly to determine how close the firm is to violating the debt covenant.

For analytical purposes, the effects of capitalizing interest can be reversed by making the following adjustments:

- Interest that was capitalized during the year should be added to interest expense. The amount of interest capitalized is disclosed in the financial statement footnotes.
- Capitalized interest, net of depreciation recognized to date, should be removed from assets and shareholders' equity.
- The allocation of interest capitalized in previous years should be removed from depreciation expense.
- Interest that was capitalized during the year is classified as a cash outflow from investing activities. For analysis, it should be added back to cash flow from investing activities and subtracted from cash flow from operating activities.
- Ratios such as interest coverage and profitability ratios should be recalculated with the restated figures. The interest coverage ratio and net profit margin will likely be lower without capitalization.

Let's work through an extended example of the financial statement effects of capitalizing interest.

## Example: Effect of capitalizing interest

Soprano Company Balance Sheet		
	20X6	20X5
<b>Assets</b>		
<b>Current assets</b>		
Cash	\$105	\$95
Receivables	205	195
Inventories	310	290
<b>Total current assets</b>	<b>\$620</b>	<b>\$580</b>
<b>Noncurrent assets</b>		
Gross property, plant, and equipment	\$1,800	\$1,700
Accumulated depreciation	(360)	(340)
<b>Net property, plant, and equipment</b>	<b>\$1,440</b>	<b>\$1,360</b>
<b>Total assets</b>	<b>\$2,060</b>	<b>\$1,940</b>
<b>Liabilities and equity</b>		
<b>Current liabilities</b>		
Payables	\$110	\$90
Short-term debt	160	140
Current portion of long-term debt	55	45
<b>Total current liabilities</b>	<b>\$325</b>	<b>\$275</b>
<b>Noncurrent liabilities</b>		
Long-term debt	\$610	\$690
Deferred taxes	105	95
<b>Stockholders' equity</b>		
Common stock	\$300	\$300
Additional paid in capital	400	400
Retained earnings	320	180
Common shareholders' equity	1,020	880
<b>Total liabilities and equity</b>	<b>\$2,060</b>	<b>\$1,940</b>

Soprano Company Income Statement		20X6
Sales		\$4,000
Cost of goods sold		\$3,000
Gross profit		1,000
Operating expense		650
Operating profit		350
Interest expense		50
Earnings before taxes		300
Taxes		100
Net income		\$200
Common dividends		\$60

During 20X6, the company capitalized \$20 of construction interest. The capitalized interest increased depreciation expense \$5 for the year. For analytical purposes, you have decided to treat the capitalized interest as an immediate expense.

Complete the following table, ignoring any income tax effects:

#### Soprano Company Answer Template

	<i>Interest Capitalized (Reported)</i>	<i>Interest Expensed (Adjusted)</i>
Total assets	\$2,060	
Interest coverage ratio	7.0	
Net profit margin	5.0%	
Cash flow from operations	\$220	
Cash flow from investing	(\$100)	
Long-term debt-to-equity	59.8%	

**Answer:**

**Adjusted total assets:** The capitalized interest, net of the related depreciation, is removed from total assets (net property, plant, and equipment). Adjusted total assets are \$2,045 (\$2,060 total assets – \$20 capitalized interest + \$5 related depreciation).

**Adjusted net profit margin:** The capitalized interest is treated as interest expense, and the related depreciation is eliminated from operating expense. Adjusted net profit margin is 4.6% [(\$200 net income – \$20 interest expense + \$5 related depreciation) / \$4,000 revenue].

**Adjusted interest coverage ratio:** The capitalized interest is treated as interest expense and the related depreciation is eliminated from EBIT. The adjusted interest coverage ratio (EBIT / interest expense) is 5.1 [(\$350 EBIT + \$5 related depreciation) / (\$50 interest expense + \$20 capitalized interest)].

**Adjusted operating cash flow:** The capitalized interest is subtracted from operating cash flow. Adjusted operating cash flow is \$200 (\$220 reported operating cash flow – \$20 capitalized interest).

**Adjusted investing cash flow:** The capitalized interest is added back to investing cash flow. Adjusted investing cash flow is –\$80 (–\$100 reported investing cash flow + \$20 capitalized interest).

*Total cash flow does not change. We have simply reclassified the interest from an investing cash flow to an operating cash flow.*



*Professor's Note: We ignored the income tax effects in this example for simplicity.*

**Adjusted long-term debt-to-equity:** The capitalized interest, net of the related depreciation expense, is subtracted from net income. Thus, shareholders' equity (retained earnings) decreases by the same amount. Adjusted long-term debt-to-equity is 60.7% [\$610 / (\$1,020 reported equity – \$20 capitalized interest + \$5 related depreciation)].

## Internal Development Costs

Intangible assets are long-term assets that lack physical substance, such as patents, brand names, copyrights, franchises, and goodwill.

With some exceptions, costs incurred by the firm to create intangible assets are expensed as incurred. Important exceptions are research and development costs and software development costs.

**Research and Development Costs.** Under IFRS, *research* costs (costs aimed at the discovery of new scientific or technical knowledge and understanding) are expensed as incurred. However, *development* costs (translation of research findings into a plan or design of a new product or process) are capitalized.



Under U.S. GAAP, both research and development costs are generally expensed as incurred with some exceptions, such as software development costs.

**Software Development Costs.** Costs incurred to develop software for sale to others are expensed as incurred until the product's technological feasibility has been established. Once technological feasibility occurs, U.S. GAAP requires subsequent costs to be capitalized. Of course, judgment is involved in determining technological feasibility. Costs incurred when a firm develops software for its own internal use are also capitalized.

The financial statement effects of capitalizing development costs are the same as other expenditures. Capitalizing results in higher net income in the first year and lower net income in the subsequent years. Similarly, assets, equity, and operating cash flow are all higher when expenditures are capitalized.

Similar to the adjustment for capitalized interest, the analyst can eliminate the capitalized software development costs from the balance sheet (reducing both assets and equity) and add the development costs to expense in the income statement. In addition, it is necessary to eliminate the amortization of software development costs from previous periods. Finally, the capitalized development costs should be reclassified on the cash flow statement from an investing outflow to an operating outflow.

The financial effects of capitalizing versus expensing an expenditure are summarized in Figure 1.

**Figure 1: Financial Statement Effects of Capitalizing vs. Expensing**

	<i>Capitalizing</i>	<i>Expensing</i>
Total assets	Higher	Lower
Shareholders' equity	Higher	Lower
Income variability	Lower	Higher
Net income (first year)	Higher	Lower
Net income (subsequent years)	Lower	Higher
Cash flow from operations	Higher	Lower
Cash flow from investing	Lower	Higher
Debt ratio & Debt-to-equity	Lower	Higher
Interest coverage (first year)	Higher	Lower
Interest coverage (subsequent years)	Lower	Higher

**LOS 22.b: Discuss the implications for financial statements and ratios of the different depreciation methods for property, plant, and equipment.**

**Depreciation** of a capitalized cost may be reported using straight-line, accelerated, or units-of-production methods.

**Straight-line depreciation** is the dominant method of computing depreciation for financial reporting purposes. Depreciation is the same amount each year over the asset's estimated life:

$$\text{depreciation expense} = \frac{\text{original cost} - \text{salvage value}}{\text{depreciable life}}$$

With an **accelerated depreciation** method, more depreciation expense is recognized in the early years of an asset's life and less depreciation expense in the later years of its life. Accelerated depreciation methods result in lower net income in the early years of an asset's life and greater net income in the later years of an asset's life, compared to straight-line depreciation. One often-used accelerated depreciation method is the double-declining balance (DDB) method:

$$\text{DDB depreciation in year } x = \frac{2}{\text{asset life in years}} \times \text{book value at beginning of year } x$$

Depreciation under the **units-of-production** method is based on usage rather than time. The depreciable basis of the asset (cost – estimated salvage value) is divided by the number of units the asset is expected to produce over its useful life to get depreciation per unit. Each year, the number of units produced is multiplied by depreciation per unit to get the depreciation expense for the year.



*Professor's Note: In all three depreciation methods, no additional depreciation expense is recognized once the asset's book value reaches its estimated salvage value.*

### Choice of Method

Under U.S. GAAP, a firm may use different depreciation methods for financial reporting and for tax reporting purposes. In many countries this is not the case. U.S. firms often use straight-line depreciation for financial reporting and an accelerated method, known as the **Modified Accelerated Cost Recovery System (MACRS)**, for tax reporting in order to reduce taxable income (and taxes paid) in the early years of an asset's life, effectively deferring payment of some taxes until the later years of the asset's life.

For a firm using straight-line depreciation for financial reporting, using an accelerated method for tax reporting purposes does not change income tax expense recognized in the income statement. The difference between income tax expense and income taxes payable in the early years is reported as an addition to the firm's deferred tax liability (on the balance sheet). In the later years, when depreciation for tax purposes is less than depreciation reported on the income statement, the excess of taxes payable over income tax expense reduces the deferred tax liability.

Note that *total* depreciation expense over an asset's life is the same under all methods. The pattern of depreciation expense, and of net income (or taxable income), is different. The totals are the same over the asset's life.

Firms can also change depreciation methods. For example, a firm may use an accelerated method initially, and then switch to the straight-line method.

A change in depreciation method is treated like a change in accounting estimate. That is, the change is put into effect in the current period and prospectively. The previous periods are not affected by the change.



*Professor's Note: Most changes in accounting principles require retroactive adjustment to the prior periods that are presented. A change in depreciation method is an exception that calls for prospective application.*

The differences in depreciation, net income, and reported net profit margin for the three methods are illustrated in the following example.

#### **Example: Effect of depreciation methods on net income**

Sackett Laboratories purchases chemical processing machinery for \$550,000. The equipment has an estimated useful life of five years and an estimated salvage value of \$50,000. The company expects to produce 20,000 units of output using this machinery, with 6,000 units in each of the first two years, 3,000 units in the next two years, and 2,000 units in the fifth year. The company's effective tax rate is 30%. Revenues are \$600,000 per year, and expenses other than depreciation are \$300,000 in each year. Calculate Sackett's net income and net profit margin if the company depreciates the machinery using (a) the straight-line method, (b) the double declining balance method, changing to the straight-line method after two years, and (c) the units of production method.

#### **Answer:**

Using the *straight-line method*, depreciation expense in each year is  $(\$550,000 - \$50,000) / 5 = \$100,000$ .

Using the *double declining balance method*, each year's depreciation is  $2 / 5$  of the book value. In year 1, depreciation expense is  $\$550,000 \times 2 / 5 = \$220,000$ , and in year 2, depreciation expense is  $(\$550,000 - \$220,000) \times 2 / 5 = \$132,000$ .

Straight-line depreciation expense for the remaining three years is  $(\$550,000 - \$220,000 - \$132,000 - \$50,000) / 3 = \$49,333$ .

Using the *units of production method*, depreciation expense in the first two years is  $(6,000 / 20,000) \times (\$550,000 - \$50,000) = \$150,000$ , in the next two years is  $(3,000 / 20,000) \times (\$550,000 - \$50,000) = \$75,000$ , and in the fifth year is  $(2,000 / 20,000) \times (\$550,000 - \$50,000) = \$50,000$ .

## Straight-line depreciation:

	<i>Year 1</i>	<i>Year 2</i>	<i>Year 3</i>	<i>Year 4</i>	<i>Year 5</i>	<i>Total</i>
Revenue	600,000	600,000	600,000	600,000	600,000	3,000,000
Other expenses	300,000	300,000	300,000	300,000	300,000	1,500,000
Depreciation expense	100,000	100,000	100,000	100,000	100,000	500,000
Pretax income	200,000	200,000	200,000	200,000	200,000	1,000,000
Tax expense	60,000	60,000	60,000	60,000	60,000	300,000
Net income	140,000	140,000	140,000	140,000	140,000	700,000
Net profit margin	23.3%	23.3%	23.3%	23.3%	23.3%	23.3%

## Double-declining balance:

	<i>Year 1</i>	<i>Year 2</i>	<i>Year 3</i>	<i>Year 4</i>	<i>Year 5</i>	<i>Total</i>
Revenue	600,000	600,000	600,000	600,000	600,000	3,000,000
Other expenses	300,000	300,000	300,000	300,000	300,000	1,500,000
Depreciation expense	220,000	132,000	49,333	49,333	49,333	500,000
Pretax income	80,000	168,000	250,667	250,667	250,667	1,000,000
Tax expense	24,000	50,400	75,200	75,200	75,200	300,000
Net income	56,000	117,600	175,467	175,467	175,467	700,000
Net profit margin	9.3%	19.6%	29.2%	29.2%	29.2%	23.3%

## Units of production:

	<i>Year 1</i>	<i>Year 2</i>	<i>Year 3</i>	<i>Year 4</i>	<i>Year 5</i>	<i>Total</i>
Revenue	600,000	600,000	600,000	600,000	600,000	3,000,000
Other expenses	300,000	300,000	300,000	300,000	300,000	1,500,000
Depreciation expense	150,000	150,000	75,000	75,000	50,000	500,000
Pretax income	150,000	150,000	225,000	225,000	250,000	1,000,000
Tax expense	45,000	45,000	67,500	67,500	75,000	300,000
Net income	105,000	105,000	157,500	157,500	175,000	700,000
Net profit margin	17.5%	17.5%	26.3%	26.3%	29.2%	23.3%

The accelerated depreciation methods result in pretax income, tax expense, net income, and net profit margins that are lower in the early years and higher in the later years, compared to straight-line depreciation. Over the entire period, however, depreciation expense, tax expense, pretax income, net income, and net profit margin are unaffected by the depreciation method chosen.

## Useful Lives and Salvage Values

Calculating depreciation expense requires estimating an asset's **useful life** and its **salvage (residual) value**. Firms can manipulate depreciation expense and, therefore, net income, by increasing or decreasing either, or both, of the estimates.

A longer estimated useful life decreases annual depreciation and increases reported net income, while a shorter estimated useful life will have the opposite effect. A higher estimate of the salvage value will also decrease depreciation and increase net income, while a lower estimate of the salvage value will increase depreciation and decrease net income.

Although companies are required to disclose information on depreciable lives, such disclosures are often given as ranges and cover groups of assets rather than specific assets. The choice of estimated lives and salvage values gives companies some ability to manage earnings. An analyst should be alert to instances of excessively long depreciable life assumptions or excessively high salvage values, both of which will lead to an overstatement of net income.

- Management could estimate a useful life longer than warranted (thus reducing depreciation expense and increasing income) and then write-down the overstated assets in a restructuring process.
- Management might also write-down assets, taking an immediate charge against income, and then record less future depreciation expense based on the reduced carrying value. This results in higher future net income in exchange for a one-time charge to current income.
- The life of a depreciable asset or the salvage value could be significantly overstated, thus understating depreciation expense during the life of the asset and increasing the loss when the asset is retired.

A change in an accounting estimate, such as useful life or salvage value, is put into effect in the current period and prospectively. That is, the change in estimate is applied to the asset's carrying (book) value and depreciation is calculated going forward using the new estimate. The previous periods are not affected by the change. Let's look at an example.

#### **Example: Change in depreciation estimate**

Alpine Company purchased machinery for \$20,000 with an estimated useful life of five years and a salvage value of \$4,000. Alpine uses the straight-line depreciation method. At the beginning of the third year, Alpine lowers its salvage value estimate to \$1,600. Determine the depreciation expense for each year.

#### **Answer:**

For the first two years, straight-line depreciation expense is equal to \$3,200 each year  $[(\$20,000 \text{ original cost} - \$4,000 \text{ salvage value}) / 5\text{-year life}]$ . At the beginning of the third year, the asset's carrying value on the balance sheet is \$13,600  $(\$20,000 \text{ original cost} - \$6,400 \text{ accumulated depreciation})$ .

To calculate straight-line depreciation expense for the remaining years, simply replace the original cost of the asset with the carrying value and depreciate using the new salvage value estimate. So, depreciation expense for the last three years is \$4,000 each year  $[(\$13,600 \text{ carrying value} - \$1,600 \text{ revised salvage value}) / 3 \text{ years remaining life}]$ .

Estimates are also involved when a manufacturing firm allocates depreciation expense between COGS and SG&A. While the allocation will not affect operating margins, it will affect gross margin (which is computed before SG&A expense) and operating expenses (which are in addition to COGS).

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**LOS 22.c: Discuss the implications for financial statements and ratios of impairment and revaluation of property, plant, and equipment, and intangible assets.**

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Both IFRS and U.S. GAAP require firms to write-down impaired assets by recognizing a loss in the income statement. However, there are differences in applying the standards.



*Professor's Note: The following discussion applies to both tangible and intangible long-lived assets (except goodwill) that are held for use. Goodwill impairment is discussed in the topic review on Intercorporate Investments.*

### Impairments under IFRS

Under IFRS, the firm must annually assess whether events or circumstances indicate an **impairment** may have occurred. For example, there may have been a significant decline in the market value of the asset or a significant change in the asset's physical condition. If so, then the asset is tested for impairment.

An asset is impaired when its carrying (book) value (original cost less accumulated depreciation) exceeds the recoverable amount. The recoverable amount is the greater of "fair value less any selling costs" and the "value in use." Value in use is the present value of the future cash flow stream from continued use. If impaired, the asset is written-down on the balance sheet to the recoverable amount, and an impairment loss, equal to the excess of carrying value over the recoverable amount, is recognized in the income statement.

Under IFRS, the loss can be reversed if the value of the impaired asset recovers in the future.

### Impairments under U.S. GAAP

Under U.S. GAAP, the asset is tested for impairment only when events and circumstances indicate the firm may not be able to recover the carrying value through future use.

Determining an impairment and calculating the loss potentially involves two steps. In the first step, the asset is tested for impairment by applying a recoverability test. If the asset is impaired, the second step involves measuring the loss.

*Recoverability.* An asset is considered impaired if the carrying value (original cost less accumulated depreciation) is greater than the asset's future *undiscounted* cash flow stream. Because the recoverability test is based on undiscounted cash flow, tests for impairment involve considerable management discretion.

*Loss measurement.* If impaired, the asset is written-down to fair value on the balance sheet and a loss, equal to the excess of carrying value over the fair value of the asset (or the *discounted* value of the future cash flows if the fair value is not known), is recognized in the income statement.

Under U.S. GAAP, loss recoveries are prohibited.



*Professor's Note: The difference in testing for impairment and measuring the impairment loss can be confusing. In testing for impairment, undiscounted cash flows are used. Once impairment has been detected, the loss is based on fair value or the discounted expected future cash flows.*

Let's take a look at an example.

#### Example: Asset impairment

Information related to equipment owned by Brownfield Company follows:

Original cost	\$900,000
Accumulated depreciation to date	\$100,000
Expected future cash flows	\$825,000
Fair value	\$790,000
Value in use	\$785,000
Selling costs	\$30,000

Assuming Brownfield will continue to use the equipment, test the asset for impairment under both IFRS and U.S. GAAP and discuss the results.

#### Answer:

The carrying value of the equipment is \$800,000 (\$900,000 original cost – \$100,000 accumulated depreciation), and the recoverable amount under IFRS is \$785,000 (greater of \$785,000 value in use and \$760,000 fair value less selling costs). Under IFRS, the asset is written-down on the balance sheet to the \$785,000 recoverable amount, and a \$15,000 loss (\$800,000 carrying value – \$785,000 recoverable amount) is recognized in the income statement.

Under U.S. GAAP, no impairment exists since the \$825,000 expected future cash flows exceed the \$800,000 carrying value.

### Impact of Impairments on Financial Statements and Ratios

Impairment reduces the carrying value of the asset on the balance sheet and is recognized as a loss in the income statement. Thus, an impairment will result in lower assets and lower equity (retained earnings).

In the year of impairment, ROA and ROE will decrease since earnings are lower. In subsequent periods, ROA and ROE will increase due to the higher earnings (due to lower depreciation) and lower assets and equity. Asset turnover will also increase because of the lower assets.



Just like depreciation, an impairment loss has no impact on cash flow. The cash flow occurred when the firm paid for the asset. Also, there are no tax savings from an impairment until the impaired asset is sold or otherwise disposed of.

### Analysis of Impairments

An impairment loss is an indication that the firm has not recognized enough depreciation or amortization expense, thereby overstating earnings.

Because of the judgment involved in forecasting an asset's future cash flows, management has considerable discretion when recognizing an impairment loss. Thus, management can easily manipulate earnings upward or downward. For example, the firm may overstate an impairment loss in the current period in order to increase earnings in the future. Future earnings are higher since depreciation (or amortization) expense of the impaired asset is lower. Overstating a loss sometimes occurs during recession or when a firm hires a new management team. Alternatively, a firm may overstate its current period earnings by understating or even ignoring an impairment loss.

### Revaluation to Fair Value

Under U.S. GAAP, most long-lived assets are reported on the balance sheet at depreciated cost (original cost less accumulated depreciation and impairment charges). Revaluing long-lived assets upward to fair value is generally prohibited. One exception relates to long-lived assets held for sale. In this case, prior impairment losses can be reversed.

Under IFRS, most firms also report long-lived assets at depreciated cost. Alternatively, firms following IFRS can choose to report long-lived assets at fair value. In fact, firms can choose depreciated cost for some asset classes and fair value for other asset classes.

The impact of revaluation on the income statement depends on whether the initial revaluation resulted in a gain or loss. If the initial revaluation resulted in a loss (decrease in carrying value), the initial loss would be recognized in the income statement and a subsequent gain would be recognized in the income statement to the extent of the loss. Revaluation gains beyond the initial loss would bypass the income statement and be recognized in other comprehensive income (shareholders' equity).

Conversely, if the initial revaluation resulted in a gain (increase in carrying value), the initial gain would bypass the income statement and be reported in other comprehensive income. Later revaluation losses would reduce other comprehensive income to the extent of the gains.

Revaluing an asset's value upward will result in:

- Higher total assets and higher shareholders' equity.
- Lower leverage ratios as measured by the debt ratio (total debt / total assets) and the debt-to-equity ratio (higher denominators).
- Higher depreciation expense and, thus, lower profitability in periods after revaluation.



- Lower ROA and ROE in periods after revaluation (lower numerators and higher denominators). However, if the increase in the asset value is the result of higher operating capacity, such higher capacity should result in higher revenues and, thus, higher earnings.

The analyst should be interested in the origin of the appraisal that supports the revaluation. Appraisals from independent sources are usually more reliable than appraisals by management.

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### LOS 22.d: Analyze and interpret the financial statement disclosures regarding long-lived assets.

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The footnotes to the financial statements typically provide the analyst considerable information about the company's fixed assets and depreciation methods. An analyst can use this data to estimate the average age of the firm's assets. The average age is useful for two reasons:

1. It helps identify older, less-efficient assets, which may make the firm less competitive.
2. An analyst can estimate when major capital expenditures will be required, which will help the analyst forecast when the firm will face significant financing requirements.

Different companies provide different levels of detail in their footnote disclosures regarding fixed assets and depreciation. Also, groupings of assets with different useful lives are common. As a result, the following methods of estimating average age of assets do not produce precise values, but can provide indications of areas that require more investigation by the analyst.



*Professor's Note: Since land is not a depreciable asset, it should be excluded when calculating the ending gross investment and ending net investment. If land is not separately disclosed, the analyst may need to make an estimate using a comparable firm where the detail is provided.*

There are three useful calculations regarding a firm's fixed assets:

- **Average age** (in years) is approximated by:

$$\frac{\text{accumulated depreciation}}{\text{annual depreciation expense}}$$

This calculation is more accurate with straight-line depreciation. The calculation can be significantly affected by the mix of assets.

- **Average depreciable life** is approximated by:

$$\frac{\text{ending gross investment}}{\text{annual depreciation expense}}$$

**Gross investment** is the original cost of the asset. Gross investment is before deducting accumulated depreciation.

- Remaining useful life is approximated by:

$$\frac{\text{ending net investment}}{\text{annual depreciation expense}}$$

Net investment is equal to original cost (gross investment) minus accumulated depreciation.



*Professor's Note: The remaining useful life can also be approximated by subtracting the average age from the average depreciable life.*

#### Example: Calculating average age and average depreciable life

At the end of 20X8, a company has gross fixed assets of \$3 million and accumulated depreciation of \$1 million. During the year, depreciation expense was \$500,000.

What is the average age, average depreciable life, and remaining useful life of the company's fixed assets?

**Answer:**

$$\text{average age} = \frac{\text{accumulated depreciation}}{\text{depreciation expense}} = \frac{\$1,000,000}{\$500,000} = 2 \text{ years}$$

$$\text{average depreciable life} = \frac{\text{ending gross investment}}{\text{depreciation expense}} = \frac{\$3,000,000}{\$500,000} = 6 \text{ years}$$

$$\text{remaining useful life} = \frac{\text{ending net investment}}{\text{depreciation expense}} = \frac{\$2,000,000}{\$500,000} = 4 \text{ years}$$

Another popular metric is to compare annual capital expenditures to depreciation expense. This gives an indication of whether the firm is replacing its PP&E at the same rate as its assets are depreciating.

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#### LOS 22.e: Discuss the implications for financial statements and ratios of leasing assets instead of purchasing assets.

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A lease is a contractual arrangement whereby the lessor, the owner of the asset, allows the lessee to use the asset for a specified period of time in return for periodic payments.

Leases are classified as either finance leases or operating leases. In the United States, a finance lease is known as a **capital lease**.

A **finance lease** is, in substance, a purchase of an asset that is financed with debt. Accordingly, at the inception of the lease, the lessee will add equal amounts to both

assets and liabilities on the balance sheet. Over the term of the lease, the lessee will recognize depreciation expense on the asset and interest expense on the liability.

An **operating lease** is essentially a rental arrangement. No asset or liability is reported by the lessee and the periodic lease payments are simply recognized as rental expense in the income statement.

Leasing can have certain benefits:

- **Less-costly financing.** Typically, a lease requires no initial down payment. Thus, the lessee conserves cash.
- **Reduced risk of obsolescence.** At the end of the lease, the asset can be returned to the lessor.
- **Less restrictive provisions.** Leases can provide more flexibility than other forms of financing because the lease agreement can be negotiated to better suit the circumstances of each party.
- **Off-balance-sheet financing.** Operating leases do not require a liability to be reported on the balance sheet, improving leverage ratios compared to borrowing the funds to purchase the asset.
- **Tax reporting advantages.** In the United States, firms can create a *synthetic lease* whereby the lease is treated as an ownership position for tax reporting purposes. This allows the lessee to deduct depreciation expense and interest expense for tax purposes. For financial reporting purposes, the lease is treated as a rental agreement and the lessee excludes the lease liability from the balance sheet.

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**LOS 22.f: Discuss the implications for financial statements and ratios of finance leases and operating leases from the perspective of both the lessor and the lessee.**

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Under IFRS, lease classification is determined by examining the economic substance of the transaction. If substantially all the rights and risks of ownership are transferred to the lessee, the lease is treated as a finance lease.

Under U.S. GAAP, specific criteria are considered. Accordingly, a lessee must treat a lease as a finance (capital) lease if *any one* of the following criteria is met:

- Title to the leased asset is transferred to the lessee at the end of the lease period.
- A **bargain purchase option** exists. A bargain purchase option is a provision that permits the lessee to purchase the leased asset for a price that is significantly lower than the fair market value of the asset at some future date.
- The lease period is 75% or more of the asset's economic life.
- The present value of the lease payments is 90% or more of the fair value of the leased asset.

A lease not meeting any of these criteria is classified as an operating lease.

## Reporting by the Lessee

The treatment of a lease as either an operating lease or finance lease determines whether or not the lease is reported on the balance sheet, how the lease expense is recognized in the income statement, and the classification of the lease payments on the cash flow statement.

**Operating lease.** At the inception of the lease, no entry is made. During the term of the lease, *rent expense*, equal to the lease payment, is recognized in the lessee's income statement. In the cash flow statement, the lease payment is reported as an outflow from operating activities.

**Finance lease.** At the inception of the lease, the lower of the *present value* of future minimum lease payments or the fair value is recognized as an asset and as a liability on the lessee's balance sheet. Over the term of the lease, the asset is depreciated and *depreciation* expense as well as *interest* expense is reported in the income statement. Interest expense is equal to the lease liability at the beginning of the period multiplied by the interest rate implicit in the lease.



*Professor's Note: In a finance lease, the interest rate used by the lessee is the lower of the lessee's incremental borrowing rate and the lessor's implicit rate. However, the interest rate is not always disclosed in the lessee's financial statements. Thus, it may be necessary for the analyst to derive the interest rate from information disclosed in the footnotes to make adjustments for analytical purposes. This procedure will be illustrated later in this topic review.*

In the cash flow statement, the lease payment is separated into interest expense and principal. Just like any amortizing loan, the principal portion of the lease payment is equal to the total payment minus the interest expense. Under U.S. GAAP, interest expense is reported in the cash flow statement as an outflow from operating activities and the principal payment is reported as an outflow from financing activities.



*Professor's Note: Under IFRS, firms can choose to report interest expense in the cash flow statement as an operating activity or as a financing activity.*

### Example: Accounting for a finance lease

Affordable Leasing Company leases a machine for its own use for four years with annual payments of \$10,000. At the end of the lease, the machine is returned to the lessor, who will sell it for its scrap value. The appropriate interest rate is 6%.

Calculate the impact of the lease on Affordable Leasing's balance sheet and income statement for each of the four years, including the immediate impact. Affordable Leasing depreciates all assets on a straight-line basis. Assume the lease payments are made at the end of the year.

**Answer:**

The lease is classified as a finance lease because the asset is being leased for 75% or more of its useful life (we know this because at the end of the lease term, the asset will be sold for scrap). The present value of the lease payments at 6% is \$34,651.

$$N = 4; I/Y = 6; PMT = -10,000; FV = 0; CPT \rightarrow PV = \$34,651$$

This amount is immediately recorded as both an asset and a liability on the lessee's balance sheet.



*Professor's Note: Here we are assuming the payments are made at the end of the year. Watch out on the exam. If the lease had called for beginning-of-the-year payments, it would have been necessary to change the payment mode on your calculator in order to compute the present value. See the Challenge Problem at the end of this reading for an example.*

Over the next four years, depreciation will be  $\$34,651 / 4 = \$8,663$  per year. The book value of the asset will decline each year by the depreciation expense.

The interest expense and liability values are shown in the following table. Note that the *principal repayment amount each period* is equal to the lease payment minus the interest expense for the period (6% times the liability at the beginning of the period).

**Affordable Leasing Example: Finance Lease Calculations**

Year	(1) Beginning Leasehold Value	(2) Interest Expense (1) $\times$ 6%	(3) Lease Payment	(4) Lease Liability (1) + (2) – (3)	(5) Book Value of the Asset
0				\$34,651	\$34,651
1	\$34,651	\$2,079	10,000	26,730	25,988
2	26,730	1,604	10,000	18,334	17,326
3	18,334	1,100	10,000	9,434	8,663
4	9,434	566	10,000	0	0

Column 5 shows the ending book value of the leased asset each year. Note that, initially, depreciation is greater than the amortization (principal repayment) of the loan, so the asset's book value declines more rapidly than the lease liability. In the later years of the lease term, annual interest expense is less and the amortization of the lease liability is greater. The book value of the leased asset and the lease liability are again equal (both are zero) at the end of the lease term.

## Financial Statement and Ratio Effects of Operating and Finance Leases

**Balance sheet.** A finance lease results in a reported asset and a liability. Consequently, turnover ratios that use total or fixed assets in their denominators will be lower when a lease is treated as a finance lease as compared to an operating lease. Return on assets will also be lower for finance leases. Most importantly, leverage ratios such as the debt-to-assets ratio and the debt-to-equity ratio will be higher with finance leases because of the reported liability. The principal payment due within the next year is reported as a current liability on the lessee's balance sheet. This reduces the lessee's current ratio and working capital (current assets minus current liabilities).

Since the liability for an operating lease does not appear on the lessee's balance sheet, operating leases are sometimes referred to as *off-balance-sheet financing activities*.

**Income statement.** All else held constant, operating income (EBIT) will be higher for companies that use finance leases relative to companies that use operating leases. With an operating lease, the entire lease payment is an operating expense, while for a finance lease, only the depreciation of the leased asset (not the interest portion of the lease payment) is treated as an operating expense.

In the previous example, let's assume Affordable Leasing can treat the lease as either an operating lease or a finance lease. Figure 2 compares the income statement effects.

**Figure 2: Affordable Leasing: Impact of Lease Accounting Method on the Income Statement**

Year	Operating Lease	Finance Lease		
	Rent Expense	Depreciation	Interest	Finance Lease Expense
1	\$10,000	\$8,663	\$2,079	\$10,742
2	10,000	8,663	1,604	10,267
3	10,000	8,663	1,100	9,763
4	<u>10,000</u>	8,663	566	<u>9,229</u>
	\$40,000			\$40,000

Total expense over the life of the lease will be equal for a lease treated as an operating lease and for a lease treated as a finance lease because the sum of depreciation expense and interest expense will equal the total of the lease payments. In the early years of a lease, however, the interest expense is higher, so the sum of depreciation and lease interest expense is greater than the lease payment. Consequently, net income will be lower for the finance lease in the early years of the lease and higher in the later years, when the interest expense is lower.

**Cash flow.** Total cash flow is unaffected by the accounting treatment of a lease. In our example, the total cash outflow is \$10,000 per year. If the lease is treated as an operating lease (rent expense = \$10,000), then the total cash payment reduces cash flow from operations. If the lease is treated as a finance lease, then only the portion of the lease payment that is considered interest expense reduces cash flow from operations. The part of the lease payment considered repayment of principal reduces cash flow from financing activities. Figure 3 illustrates that for a finance lease, cash flow from operations (CFO) is higher and cash flow from financing (CFF) is lower, compared to an operating lease.

**Figure 3: Affordable Leasing: Impact on Cash Flow**

<i>Year</i>	<i>Finance Lease</i>		<i>Operating Lease</i>
	<i>CF Operations</i>	<i>CF Financing</i>	<i>CF Operations</i>
1	–\$2,079	–\$7,921	–\$10,000
2	–1,604	–8,396	–10,000
3	–1,100	–8,900	–10,000
4	–566	–9,434	–10,000

If Affordable Leasing treats the lease as a finance lease, CFO is reduced by \$2,079 in Year 1 and if it treats the lease as an operating lease, CFO is reduced by \$10,000. Companies with finance leases will show higher CFO relative to firms that use operating leases (all else the same).

Figure 4 and Figure 5 summarize the differences between the effects of finance leases and operating leases on the financial statements of the lessee.

**Figure 4: Financial Statement Impact of Lease Accounting**

	<i>Finance Lease</i>	<i>Operating Lease</i>
Assets	Higher	Lower
Liabilities (current and long-term)	Higher	Lower
Net income (in the early years)	Lower	Higher
Net income (later years)	Higher	Lower
Total net income	Same	Same
EBIT (operating income)	Higher	Lower
Cash flow from operations	Higher	Lower
Cash flow from financing	Lower	Higher
Total cash flow	Same	Same

**Figure 5: Ratio Impact of Lease Accounting**

	<i>Finance Lease</i>	<i>Operating Lease</i>
Current ratio (CA / CL)	Lower	Higher
Working capital (CA – CL)	Lower	Higher
Asset turnover (Revenue / TA)	Lower	Higher
Return on assets* (NI / TA)	Lower	Higher
Return on equity* (NI / SE)	Lower	Higher
Debt / Assets	Higher	Lower
Debt / Equity	Higher	Lower

\* In the early years of the lease.

In sum, all the ratios in Figure 5 are worse when the lease is capitalized. The only improvements from a finance lease are higher EBIT (because interest is not subtracted in calculating EBIT), higher CFO (because principal repayment is CFF), and higher net income in the later years of the lease (because interest plus depreciation is less than the lease payment in the later years).



*Professor's Note: There are two points that candidates often find confusing here. First, interest payments are an operating cash flow but are not considered an operating expenditure. That is, they are not subtracted in calculating operating income (EBIT). Second, adding equal amounts to assets and liabilities will typically increase the debt-to-assets ratio. Since assets are typically larger than debt (liabilities), the numerator of the debt-to-assets ratio increases by a greater proportion than the denominator when equal amounts are added to each, so the ratio increases. With respect to the current ratio and working capital, the current year principal amortization for a finance lease is added to current liabilities, but there is no increase in current assets as a result of treating the lease as a finance lease.*

## Lease Disclosures

Lessees are required to disclose useful information about finance leases and operating leases in the financial statements or in the footnotes. For example, under U.S. GAAP, the lessee must disclose the lease payments that are due in each of the next five years. Lease payments due after five years can be aggregated.

Unfortunately, the interest rate used in the lessee's calculations is not always disclosed. Thus, it may be necessary for an analyst to derive the interest rate in order to make adjustments for analytical purposes. The interest rate is simply the internal rate of return (IRR) of the future lease payments; that is, the interest rate that equates the present value of the lease with the future lease payments.

### Example: Lessee's footnote disclosure

Mustang Company conducts part of its operations from leased premises using various finance leases that expire in 10 years. In addition, Mustang leases equipment under noncancelable operating leases. The future minimum lease payments are:

<i>Years</i>	<i>Finance Leases</i>	<i>Operating Leases</i>
1	\$570	\$125
2	570	110
3	530	90
4	290	70
5	260	65
Thereafter (evenly from Years 6 to 10)	<u>1,000</u>	<u>250</u>
Total minimum lease payments	\$3,220	\$710
Less interest portion	<u>865</u>	
Present value of future minimum lease payments	\$2,355	

**Part A.** Calculate the implicit interest rate used by lessee.

**Part B.** Assume that Mustang reported debt of \$2,950 and equity of \$800 at the inception of the lease. If Mustang had treated the operating leases as finance leases, calculate the effects on the debt-to-equity ratio.



**Answer:**

**Part A.** Use the IRR function on your financial calculator to solve for the interest rate that will equate the present value of \$2,355 with the future lease payments. The result is an IRR of 8.2%.

<i>Year</i>	<i>Cash Flow</i>	<i>Calculator Register</i>
0	–\$2,355	CF <sub>0</sub>
1	570	CF <sub>1</sub>
2	570	CF <sub>2</sub>
3	530	CF <sub>3</sub>
4	290	CF <sub>4</sub>
5	260	CF <sub>5</sub>
6	200	CF <sub>6</sub>
7	200	CF <sub>7</sub>
8	200	CF <sub>8</sub>
9	200	CF <sub>9</sub>
10	200	CF <sub>10</sub>

The analyst can use the implicit lease rate to forecast lease interest expense and amortization of the lease liability when forecasting net income and balance sheet values for future periods. Analysts can also use the implicit lease rate to discount future operating lease payments to calculate the amount that operating leases would add to assets and liabilities if treated as finance leases (as we illustrate in Part B).

**Part B.** Use the NPV function on your financial calculator to compute the present value of the operating lease payments discounted at the implicit interest rate of 8.2%. The result is a PV of \$509.

<i>Year</i>	<i>Cash Flow</i>	<i>Calculator Register</i>
0	0	CF <sub>0</sub>
1	125	CF <sub>1</sub>
2	110	CF <sub>2</sub>
3	90	CF <sub>3</sub>
4	70	CF <sub>4</sub>
5	65	CF <sub>5</sub>
6	50	CF <sub>6</sub>
7	50	CF <sub>7</sub>
8	50	CF <sub>8</sub>
9	50	CF <sub>9</sub>
10	50	CF <sub>10</sub>

Mustang's reported debt-to-equity ratio was 3.7 (\$2,950 debt / \$800 equity). Adjusting Mustang's debt for the operating lease results in a debt-to-equity ratio of 4.3 [(\$2,950 reported debt + \$509 PV of operating lease) / \$800 reported equity].

Alternatively, an analyst can approximate the present value of the operating lease liability and asset by using the ratio of the present value of finance lease payments to the total finance lease payments. Here, that ratio is  $\$2,355 / \$3,220 = 73.1\%$ . Using this approximation, the present value of the operating lease is  $\$710 \times 73.1\% = \$519$ , which is close to the actual present value of the future minimum operating lease payments of \$509 calculated in Part B.

## Reporting by the Lessor

From the lessor's perspective, the lease is also classified as either an operating lease or a finance (capital) lease.

Under U.S. GAAP, if any one of the finance lease criteria for lessees is met, the collectability of lease payments is reasonably certain, and the lessor has substantially completed performance, the lessor must treat the lease as a finance (capital) lease. Otherwise, the lessor will treat the lease as an operating lease.

From the lessor's perspective, the capital lease is treated as either a sales-type lease or a direct financing lease. The two types of leases are distinguished by the initial difference in the present value of the lease payments and the carrying value of the asset. If the present value of the lease payments exceeds the carrying value of the asset, the lease is treated as a sales-type lease. If the present value of the lease payments is equal to the carrying value, the lease is treated as a direct financing lease.

IFRS does not distinguish between a sales-type lease and a direct financing lease. However, similar treatment to a sales-type lease is allowed under IFRS for finance leases originated by manufacturers or dealers. In this case, the present value of the lease payments likely exceeds the carrying value of the asset.

## Sales-Type Lease

A **sales-type lease** is treated as if the lessor sold the asset and provided the financing to the buyer.

The lease is treated as a sales-type lease if the present value of the lease payments exceeds the carrying value of the asset. This will typically be the case when the lessor is a manufacturer or dealer because the cost of the leased asset will usually be less than its fair value.

At the inception of the lease, the lessor will recognize a sale equal to the present value of the lease payments, and cost of goods sold equal to the carrying value of the asset. Just as with a normal sales transaction, the difference between the sales price and cost of goods sold is gross profit. The asset is removed from the balance sheet and a lease receivable, equal to the present value of the lease payments, is created. As the lease payments are received, the principal portion of the payment reduces the lease receivable. It is as if the lessor sold the asset for its fair market value, and loaned the lessee the purchase price.

In addition to the gross profit, the lessor also recognizes interest revenue over the term of the lease. The interest revenue is equal to the lease receivable at the beginning of the period multiplied by the interest rate.

In the cash flow statement, the interest revenue portion of the lease payment is reported as an inflow from operating activities and the principal reduction is reported as an inflow from investing activities, just as with any amortizing loan the lessor may make.

### Direct Financing Lease

In a **direct financing lease**, no gross profit is recognized by the lessor at the inception of the lease. The lessor is simply providing a financing function to the lessee.

The lease is treated as a direct financing lease if the present value of the lease payments is equal to the carrying value of the leased asset. In this case, the lessor is not usually a manufacturer or dealer. Instead, the lessor may have purchased the asset from a third party. Thus, no gross profit is recognized.

At the inception of the lease, the lessor removes the asset from the balance sheet and a lease receivable is created in the same amount. As the lease payments are received, the principal portion of payment reduces the lease receivable.

In the income statement, the lessor recognizes interest income over the term of the lease. The interest portion of each lease payment is equal to the lease receivable at the beginning of the period multiplied by the interest rate.

In the cash flow statement, the interest portion of the lease payment is reported as an inflow from operating activities and the principal reduction is reported as an inflow from investing activities.

#### Example: Direct financing lease

Assume Johnson Company purchases an asset for \$69,302 to lease to Carver, Inc. for four years with an annual lease payment of \$20,000 at the end of each year. At the end of the lease, Carver will own the asset for no additional payment. The implied interest rate in the lease is 6% ( $N = 4$ ,  $PV = -69,302$ ,  $PMT = 20,000$ ,  $FV = 0$ ,  $CPT I/Y \rightarrow 6$ ). Determine how Johnson should account for the lease payments from Carver.

**Answer:**

Since the present value of lease payments of \$69,302 is equal to the carrying value of the asset, Johnson treats the lease as a direct financing lease. Johnson removes the leased asset from the balance sheet and records a lease receivable of \$69,302. The lease payments are recorded as follows:

<i>Year</i>	<i>(1) Beginning Lease Receivable</i>	<i>(2) Interest Income (1) × 6%</i>	<i>(3) Lease Payment</i>	<i>(4) Ending Lease Receivable (1) + (2) – (3)</i>
0				\$69,302
1	\$69,302	\$4,158	\$20,000	\$53,460
2	53,460	3,208	20,000	36,668
3	36,668	2,200	20,000	18,868
4	18,868	1,132	20,000	0

Interest income received each year will increase earnings. In the cash flow statement, the interest income is reported as an inflow from operating activities. The principal reduction (column 3 – column 2) reduces the lease receivable and is treated in the cash flow statement as an inflow from investing activities.

If Johnson had manufactured the equipment with a cost of goods of \$60,000, it would have recorded a gross profit of  $\$69,302 - \$60,000 = \$9,302$  at lease inception, put a lease receivable of \$69,302 on its balance sheet, and then accounted for the interest income portion of the lease payments just as in the table above.

**Operating Lease**

If the lease is treated as an **operating lease**, the lessor simply recognizes the lease payment as rental income. In addition, the lessor will keep the leased asset on its balance sheet and recognize depreciation expense over the asset's useful life.

Returning to our example, if Johnson treats the lease as an operating lease, \$20,000 of rental income is recognized each year. In addition, depreciation expense of \$17,325.50 ( $\$69,302 / 4$  years) is also recognized. Figure 6 compares the income from a direct financing lease and an operating lease.

**Figure 6: Income Comparison of a Direct Financing Lease and Operating Lease**

<b>Direct Financing Lease</b>			<b>Operating Lease</b>	
<i>Year</i>	<i>Interest Income</i>	<i>Rental Income</i>	<i>Depreciation Expense</i>	<i>Operating Lease Income</i>
1	\$4,158	\$20,000	\$17,325	\$2,675
2	3,208	20,000	17,326	2,674
3	2,200	20,000	17,325	2,675
4	<u>1,132</u>	20,000	17,326	<u>2,674</u>
	\$10,698			\$10,698

Total income over the life of the lease is the same for an operating lease and a direct financing lease. However, in the early years of the lease, the income reported from the direct financing lease is higher than the income reported from the operating lease. Just like an amortizing loan, the interest is higher in the early years. This situation reverses in the later years of the lease.

In the cash flow statement, the classifications result in significant differences in cash flow from operations, as seen in Figure 7.

**Figure 7: Cash Flow Comparison to the Lessor of a Direct Financing Lease and an Operating Lease**

Year	Direct Financing Lease		Operating Lease
	CF Operations	CF Investing	CF Operations
1	\$4,158	\$15,842	\$20,000
2	3,208	16,792	20,000
3	2,200	17,800	20,000
4	1,132	18,868	20,000

Total cash flow is the same for an operating lease and a direct financing lease. However, cash flow from operations is higher with the operating lease. With a direct financing lease, the lease payment is separated into the interest portion (CFO) and principal portion (CFI).



*Professor's Note: From the lessee's perspective, principal is a financing outflow. From the lessor's perspective, principal is a return of capital invested in the lease. Thus, the principal is reported as an investing inflow.*

## KEY CONCEPTS

### LOS 22.a

When a firm makes an expenditure, it can either capitalize the cost as an asset on the balance sheet or expense the cost in the income statement. Capitalizing results in higher assets, higher equity, and higher operating cash flow as compared to expensing. Capitalizing also results in higher earnings in the first year and lower earnings in subsequent years as the cost is depreciated.

Interest incurred during construction of an asset is generally capitalized. The capitalized interest is then depreciated over the life of the asset. Because the result is a higher interest coverage ratio, some analysts reverse the transaction and treat the interest as an expense.

Under U.S. GAAP, research and development costs are expensed as incurred. Under IFRS, research costs are expensed and development costs are capitalized.

### LOS 22.b

In the early years of an asset's life, accelerated depreciation will result in higher depreciation expense, lower net income, and lower ROA and ROE as compared to straight-line depreciation. Cash flow is the same assuming tax depreciation is unaffected by the choice of method for financial reporting purposes.

Firms can lower depreciation expense and increase net income by using longer useful lives and higher salvage values.

### LOS 22.c

Under IFRS, an asset is impaired when its carrying value exceeds the recoverable amount. The recoverable amount is the greater of fair value less selling costs and the value in use (present value of expected cash flows). If impaired, the asset is written-down to the recoverable amount. Loss recoveries are permitted.

Under U.S. GAAP, an asset is impaired if its carrying value is greater than the asset's undiscounted future cash flows. If impaired, the asset is written-down to fair value. Subsequent recoveries are not allowed for assets held for use.

Asset impairments involve considerable management discretion. When the impairment loss is recognized, ROA and ROE will decrease. In subsequent periods, ROA and ROE will increase as a result of lower assets and lower equity. Impairments have no impact on cash flow.

Under IFRS, firms have the option to revalue assets based on fair value. Revaluation under U.S. GAAP is not permitted.

**LOS 22.d**

The average age of fixed assets can be compared to the average useful life to estimate the timing of a company's future capital expenditures.

- Average age (in years) = accumulated depreciation / annual depreciation expense.
- Average depreciable life = ending gross investment / annual depreciation expense.
- Remaining useful life = ending net investment / annual depreciation expense.

**LOS 22.e**

Compared to purchasing an asset, leasing may provide the lessee with less costly financing, reduce the risk of obsolescence, and include less restrictive provisions than a typical loan. Synthetic leases provide tax advantages and keep the lease liability off the balance sheet.

**LOS 22.f**

A finance lease is, in substance, a purchase of an asset that is financed with debt. Finance lease expense consists of depreciation of the asset and interest on the loan. The finance lease payment consists of an operating outflow of cash (interest expense) and a financing outflow of cash (principal reduction).

An operating lease is simply a rental arrangement. No asset or liability is reported by the lessee. The rental payment is reported as an expense and as an operating outflow of cash.

Compared to an operating lease, a finance lease will result in higher assets, liabilities, leverage ratios, operating cash flow, and operating income. A finance lease will result in lower net income in the early years of the lease, lower financing cash flows, and lower working capital and current ratio.

From the lessor's perspective, a finance lease is either a sales-type lease or a direct financing lease. With both leases, a lease receivable, equal to the present value of the lease payments, is created at the inception of the lease. The lease payments are treated as part interest income (CFO) and part principal reduction (CFI).

When the present value of the lease payments exceeds the asset's carrying value, the lease is considered a sales-type lease. The lessor reports gross profit at the inception of the lease and interest income over the life of the lease.

When the present value of lease payments is equal to the asset's carrying value, the lease is considered a direct financing lease. The lessor reports interest income only. No gross profit is recognized.

## CONCEPT CHECKERS

1. Red Company expenses its development costs while Black Company capitalizes its development costs. All else equal, Red Company will:
  - A. show smoother reported earnings than Black Company.
  - B. report higher operating cash flow than Black Company.
  - C. report higher asset turnover than Black Company.
2. In the early years of an asset's life, compared to a firm using straight-line depreciation, a firm using the double-declining balance method will report lower:
  - A. depreciation expense.
  - B. operating cash flow.
  - C. retained earnings.
3. According to U.S. GAAP, an asset is impaired when:
  - A. the firm cannot fully recover the carrying amount of the asset through operations.
  - B. accumulated depreciation plus salvage value exceeds acquisition cost.
  - C. the present value of future cash flows from an asset exceeds its carrying value.
4. Compute the remaining useful life of the following asset:
 

Original cost	\$1,500,000
Accumulated depreciation	\$675,000
Straight-line depreciation expense	\$225,000

  - A. 3.0 years.
  - B. 3.7 years.
  - C. 6.7 years.
5. As compared to purchasing an asset, which of the following is *least likely* an incentive to structure a transaction as a finance lease.
  - A. At the end of the lease, the asset is returned to the lessor.
  - B. The terms of the lease can be negotiated to better meet each party's needs.
  - C. The lease enhances the lessee's balance sheet by including the lease liability.
6. Which of the following statements about direct financing leases and operating leases is *least accurate* for a lessor?
  - A. Total cash flows are not affected by the accounting treatment of the lease.
  - B. As compared to an operating lease, a direct financing lease will result in higher operating cash flows.
  - C. An operating lease will result in lower earnings in the early years of the lease, while the direct financing lease will result in lower earnings in the later years.



## CHALLENGE PROBLEM

7. On January 1, 2011, Elston Manufacturing leases a mold making machine for four years. The lease calls for a payment of \$12,000 per year payable at the beginning of the year. At the end of four years, Elston will return the machine to the lessor, who will sell it for scrap. The appropriate interest rate is 9%. Elston depreciates all assets on straight-line basis.

For the year ending December 31, 2012, the total expense pertaining to this lease reported on the Elston's income statement is *closest* to:

- A. \$12,494.
- B. \$11,992.
- C. \$12,000.

## ANSWERS – CONCEPT CHECKERS

1. C As compared to a firm that capitalizes its expenditures, a firm that expenses expenditures will report lower assets. Thus, asset turnover (revenue / average assets) will be higher for the expensing firm (lower denominator).
2. C In the early years, accelerated depreciation will result in higher depreciation expense and, thus, lower net income. Lower net income will result in lower retained earnings.
3. A An asset is impaired when the firm cannot recover the carrying value. Under U.S. GAAP, recoverability is tested based on undiscounted future cash flows.
4. B 
$$\text{Remaining useful life} = \frac{\text{ending net investment}}{\text{depreciation expense}} = \frac{1,500,000 - 675,000}{225,000} = 3.7 \text{ years}$$
5. C Operating leases enhance the balance sheet by excluding the lease liability. With a finance lease, an asset and liability are reported on the balance sheet just like an asset purchase with debt.
6. B For an operating lease, all of the lease payment is reported by the lessor as an operating inflow. With a direct financing lease, the payment is separated into interest revenue (operating inflow) and principal reduction (investing inflow). The accounting treatment of a lease affects the classification of cash flows but not the total cash flows.

## ANSWER – CHALLENGE PROBLEM

7. A The lease is classified as a finance lease because the asset is being leased for 75% or more of its useful life (we know this because at the end of the lease term, the asset will be sold for scrap).

The present value of the lease payments at 9% is \$42,376:

(BGN mode) N=4; I/Y=9; PMT = -12,000; FV = 0; CPT → PV = \$42,376

Over the next four years, depreciation will be  $\$42,376 / 4 = \$10,594$  per year.

The interest expense is calculated as follows:

<i>Year</i>	<i>Beginning Leasehold Value</i>	<i>Lease Payment</i>	<i>Balance</i>	<i>Interest</i>	<i>Ending Leasehold Value</i>
(1)	(2)	(3)	(4) = (2) – (3)	(5) = (4) × 0.09	(6) = (4) + (5)
1	\$42,376	\$12,000	\$30,376	\$2,734	\$33,109
2	\$33,109	\$12,000	\$21,109	\$1,900	\$23,009
3	\$23,009	\$12,000	\$11,009	\$991	\$12,000
4	\$12,000	\$12,000	\$0	\$0	\$0

The total expense under finance lease is interest expense + depreciation.

For Year 2 (year ending December 31, 2012), the total expense under finance lease is  $1,900 + 10,594 = \$12,494$ .

# INTERCORPORATE INVESTMENTS

Study Session 6

## EXAM FOCUS

There are no shortcuts here. Spend the time necessary to learn how and when to use each method of accounting for intercorporate investments because the probability of this material being tested is high. Be able to determine the effects of each method on the financial statements and ratios. Pay particular attention to the examples illustrating the difference between the equity method and the acquisition method.

## CATEGORIES OF INTERCORPORATE INVESTMENTS

**LOS 23.a: Describe the classification, measurement, and disclosure under the International Financial Reporting Standards (IFRS) for 1) investments in financial assets, 2) investments in associates, 3) joint ventures, 4) business combinations, and 5) special purpose and variable interest entities (SPEs, VIEs).**

**LOS 23.b: Distinguish between IFRS and U.S. GAAP in the classification, measurement, and disclosure of investments in financial assets, investments in associates, joint ventures, business combinations, and special purpose and variable interest entities.**

Intercorporate investments in marketable securities are categorized as either (1) investments in financial assets (when the investing firm has no significant control over the operations of the investee firm), (2) investments in associates (when the investing firm has significant influence over the operations of the investee firm, but not control), or (3) business combinations (when the investing firm has control over the operations of the investee firm).

Percentage of ownership (or voting control) is typically used to determine the appropriate category for financial reporting purposes. However, the ownership percentage is only a guideline. Ultimately, the category is based on the investor's ability to influence or control the investee.

**Financial assets.** An ownership interest of less than 20% is usually considered a passive investment. In this case, the investor cannot significantly influence or control the investee.

IFRS classifies investments in financial assets as held-to-maturity, available-for-sale, or fair value through profit or loss (which includes held-for-trading and securities designated at fair value). Under U.S. GAAP, marketable financial assets are classified as held-to-maturity, available-for-sale, held-for-trading, or designated at fair value.

**Investments in associates.** An ownership interest between 20% and 50% is typically a noncontrolling investment; however, the investor can usually significantly influence the investee's business operations. Significant influence can be evidenced by the following:

- Board of directors representation.
- Involvement in policy making.
- Material intercompany transactions.
- Interchange of managerial personnel.
- Dependence on technology.

It may be possible to have significant influence with less than 20% ownership. In this case, the investment is considered an investment in associates. Conversely, without significant influence, an ownership interest between 20% and 50% is considered an investment in financial assets.

The equity method is used to account for investments in associates.

**Business combinations.** An ownership interest of more than 50% is usually a controlling investment. When the investor can control the investee, the acquisition method is used.

It is possible to own more than 50% of an investee and not have control. For example, control can be temporary or barriers may exist such as bankruptcy or governmental intervention. In these cases, the investment is not considered controlling.

Conversely, it is possible to control with less than a 50% ownership interest. In this case, the investment is still considered a business combination.

**Joint ventures.** A joint venture is an entity whereby control is shared by two or more investors. Under International Financial Reporting Standards (IFRS), proportionate consolidation is the preferred accounting method for joint ventures although the equity method is permitted. Under U.S. GAAP, the equity method is required. Proportionate consolidation is not allowed under U.S. GAAP except in very limited situations.

Figure 1 summarizes the accounting treatment for investments.

**Figure 1: Accounting for Investments**

<i>Ownership</i>	<i>Degree of Influence</i>	<i>Accounting Treatment</i>
Less than 20% (Investments in financial assets)	No significant influence	Held-to-maturity, available-for-sale, held-for-trading, or designated at fair value (through P/L)
20%–50% (Investment in associates)	Significant influence	Equity method
More than 50% (Business combinations)	Control	Acquisition method
50% / 50% (Joint venture)	Shared control	IFRS: Proportionate consolidation preferred; U.S. GAAP: Equity method

## REPORTING OF INTERCORPORATE INVESTMENTS

### Financial Assets

Investment ownership of less than 20% is usually considered passive. The acquisition of financial assets is recorded at cost (presumably the fair value at acquisition), and any dividend or interest income is recognized in the investor's income statement.

Recognizing the change in the fair value of financial assets depends on their classification as either held-to-maturity, held-for-trading, or available-for-sale. Firms can also designate financial assets and financial liabilities at fair value.

**Held-to-maturity.** Held-to-maturity securities are debt securities acquired with the intent and ability to be held-to-maturity. The securities cannot be sold prior to maturity except in unusual circumstances.

Long-term held-to-maturity securities are reported on the balance sheet at amortized cost. Amortized cost is the original cost of the debt security plus any discount, or minus any premium, that has been amortized to date.



*Professor's Note: Amortized cost is simply the present value of the remaining cash flows (coupon payments and face amount) discounted at the market rate of interest at issuance.*

Interest income (coupon cash flow adjusted for amortization of premium or discount) is recognized in the income statement but subsequent changes in fair value are ignored.

**Held-for-trading.** Held-for-trading securities are debt and equity securities acquired for the purposes of profiting in the near term, usually less than three months. Held-for-trading securities are reported on the balance sheet at fair value. The changes in fair value, both realized and unrealized, are recognized in the income statement along with any dividend or interest income.

**Designated at fair value.** Firms can choose to report debt and equity securities that would otherwise be treated as held-to-maturity or available-for-sale securities at fair value. Designating financial assets and liabilities at fair value can reduce volatility and inconsistencies that result from measuring assets and liabilities using different valuation bases. Unrealized gains and losses on designated financial assets and liabilities are recognized on the income statement, similar to the treatment of held-for-trading securities.



*Professor's Note: U.S. GAAP uses the term "designated at fair value" while IFRS uses the term "fair value through profit or loss." On the exam, either term may be used and mean the same thing.*

**Available-for-sale.** Available-for-sale securities are debt and equity securities that are neither held-to-maturity nor held-for-trading. Like held-for-trading securities, available-for-sale securities are reported on the balance sheet at fair value. However, only the realized gains or losses, and the dividend or interest income, are recognized in

the income statement. The unrealized gains and losses are excluded from the income statement and are reported as a separate component of stockholders' equity.

Under U.S. GAAP, the unrealized gains and losses are reported in the "other comprehensive income" section of stockholders' equity. When the securities are sold, the unrealized gains and losses are removed from other comprehensive income, as they are now realized, and recognized in the income statement.

The treatment under IFRS is similar to U.S. GAAP, except for unrealized gains or losses that result from foreign exchange movements. Foreign exchange gains and losses on available-for-sale securities are recognized in the income statement under IFRS. The entire unrealized gain or loss is recognized in equity under U.S. GAAP.

Let's look at an example of the different classifications for financial assets.

#### Example: Investment in financial assets

At the beginning of the year, Midland Corporation purchased a 9% bond with a face value of \$100,000. The bond was issued for \$96,209 to yield 10%. The coupon payments are made annually at year-end. Let's assume the fair value of the bond at the end of the year is \$98,500.

Determine the impact on Midland's balance sheet and income statement if the bond investment is classified as held-to-maturity, held-for-trading (or fair value through profit or loss), and available-for-sale.

#### Answer:

**Held-to-maturity.** The balance sheet value is based on amortized cost. At year-end, Midland recognizes interest revenue of \$9,621 ( $\$96,209 \text{ beginning bond investment} \times 10\% \text{ market rate at issuance}$ ). The interest revenue includes the coupon payment of \$9,000 ( $\$100,000 \text{ face value} \times 9\% \text{ coupon rate}$ ) and the amortized discount of \$621 ( $\$9,621 \text{ interest revenue} - \$9,000 \text{ coupon payment}$ ).

At year-end, the bond is reported on the balance sheet at \$96,830 ( $\$96,209 \text{ beginning bond investment} + \$621 \text{ amortized discount}$ ).

**Held-for-trading.** The balance sheet value is based on fair value of \$98,500. Interest revenue of \$9,621 ( $\$96,209 \text{ beginning bond investment} \times 10\% \text{ yield-to-maturity at issuance}$ ) and an unrealized gain of \$1,670 ( $\$98,500 - \$96,209 - \$621$ ) are recognized in the income statement.

**Available-for-sale.** The balance sheet value is based on fair value of \$98,500. Interest revenue of \$9,621 ( $\$96,209 \text{ beginning bond investment} \times 10\% \text{ yield-to-maturity at issuance}$ ) is recognized in the income statement. The unrealized gain of \$1,670 ( $\$98,500 - \$96,209 - \$621$ ) is reported in stockholders' equity as a component of other comprehensive income (U.S. GAAP) or direct to equity (IFRS).

Now let's assume the bonds are called on the first day of the next year for \$101,000. Calculate the gain or loss recognition for each classification.

**Held-to-maturity:** A realized gain of \$4,170 ( $\$101,000 - \$96,830$  carrying value) is recognized in the income statement.

**Held-for-trading:** A net gain of \$2,500 ( $\$101,000 - \$98,500$  carrying value) is recognized in the income statement.

**Available-for-sale:** The unrealized gain of \$1,670 is removed from equity, and a realized gain of \$4,170 ( $\$101,000 - \$96,830$ ) is recognized in the income statement.

Figure 2 summarizes the effects of the different classifications for financial assets on the balance sheet and income statement.

**Figure 2: Summary of Classifications of Financial Assets**

	<i>Held-to-Maturity</i>	<i>Held-for-Trading*</i>	<i>Available-for-Sale</i>
Balance sheet	Amortized cost	Fair value	Fair value with unrealized G/L recognized in equity
Income statement	Interest (including amortization) Realized G/L**	Interest Dividends Realized G/L Unrealized G/L	Interest Dividends Realized G/L

\* Also, financial assets designated at fair value.

\*\* G/L = Gain and losses.

### *Reclassification of Investments in Financial Assets*

IFRS typically does not allow reclassification of investments into and out of fair value through profit or loss category and reclassification of investments out of held-for-trading category.

Debt securities classified as available-for-sale can be reclassified as held-to-maturity if the holder intends to (and is able to) hold the debt to its maturity date. The security's balance sheet value is remeasured to reflect its fair value at the time it is reclassified. Any difference between this amount and the maturity value, and any gain or loss that had been recorded in other comprehensive income, is amortized over the security's remaining life.

Held-to-maturity securities can be reclassified as available-for-sale if the holder no longer intends or is no longer able to hold the debt to maturity. The carrying value is remeasured to the security's fair value, with any difference recognized in other comprehensive income. Note that reclassifying a held-to-maturity security may prevent the holder from classifying other debt securities as held-to-maturity, or even require other held-to-maturity debt to be reclassified as available-for-sale.

U.S. GAAP does permit securities to be reclassified into or out of held-for-trading or designated at fair value. Unrealized gains are recognized on the income statement at the time the security is reclassified. For investments transferring out of available-for-sale category into held-for-trading category, the cumulative amount of gains and losses previously recorded under other comprehensive income is recognized in income. For a debt security transferring out of available-for-sale category into held-to-maturity category, the cumulative amount of gains and losses previously recorded under other comprehensive income is amortized over the remaining life of the security. For transferring investments into available-for-sale category from held-to-maturity category, the unrealized gain/loss is transferred to comprehensive income.

### *Impairment of Financial Assets*

If the value that can be recovered for a financial asset is less than its carrying value and is expected to remain so, the financial asset is impaired. IFRS and U.S. GAAP require that held-to-maturity and available-for-sale securities are evaluated for impairment at each reporting period. This is not necessary for held-for-trading and designated at fair value securities because declines in their values are recognized on the income statement as they occur. Under U.S. GAAP, a security is considered impaired if its decline in value is determined to be other than temporary.

Under IFRS, impairment of a debt security is indicated if at least one *loss event* has occurred and its effect on the security's future cash flows can be estimated reliably. Loss events can include default on payments of interest or principal, likely bankruptcy or reorganization of the issuer, concessions from the bondholders, or other indications of financial difficulty on the part of the issuer. However, a credit rating downgrade or the lack of a liquid market for the debt are not considered indications of impairment in the absence of other evidence.

An equity security can be considered impaired if its fair value has experienced a substantial or extended decline below its carrying value, or if changes in the business environment facing the equity issuer (such as economic, legal, or technological developments) have made it unlikely that the value of the equity will recover to its initial cost.

If a held-to-maturity security has become impaired, its carrying value is decreased (either directly or with an allowance account) to the present value of its estimated future cash flows, using the same effective interest rate that was used when the security was purchased. The loss is recognized on the income statement. If the security's value recovers in a later period, and its recovery can be attributed to an event (such as a credit upgrade), the impairment loss can be reversed.

If an available-for-sale security has become impaired, any unrealized losses that have been recognized in other comprehensive income are reclassified and recognized on the income statement. Under IFRS, impairments of available-for-sale debt securities may be reversed under the same conditions as impairments of held-to-maturity securities. Reversals of impairments are not permitted for equity securities. Under U.S. GAAP, impairment losses on available-for-sale securities may not be reversed for either debt or equity.



### *Analysis of Investments in Financial Assets*

When analyzing a firm with investments in financial assets, it is important to separate the firm's operating results from its investment results (e.g., interest, dividends, and gains and losses).

For comparison purposes, using market values for financial assets is generally preferred. Also, it is necessary to remove nonoperating assets when calculating the return on operating assets ratio.

Finally, the analyst must assess the effects of investment classification on reported performance. Investment results may be misleading because of inconsistent treatment of unrealized gains and losses. For example, if security prices are increasing, an investor that classifies an investment as held-for-trading will report higher earnings than if the investment is classified as available-for-sale. This is because the unrealized gains are recognized in the income statement for a held-for-trading security. The unrealized gains are reported in stockholders' equity for an available-for-sale security.

### **Investments in Associates**

Investment ownership of between 20% and 50% is usually considered influential. Influential investments are accounted for using the equity method. Under the equity method, the initial investment is recorded at cost and reported on the balance sheet as a noncurrent asset.

In subsequent periods, the proportionate share of the investee's earnings increases the investment account on the investor's balance sheet and is recognized in the investor's income statement. Dividends received from the investee are treated as a return of capital and thus, reduce the investment account. Unlike investments in financial assets, dividends received from the investee are not recognized in the investor's income statement.

If the investee reports a loss, the investor's proportionate share of the loss reduces the investment account and also lowers earnings in the investor's income statement. If the investee's losses reduce the investment account to zero, the investor usually discontinues use of the equity method. The equity method is resumed once the proportionate share of the investee's earnings exceed the share of losses that were not recognized during the suspension period.

Unlike financial assets, the investment account is not reported at fair value. However, for the fiscal years beginning after November 15, 2007, equity method investors can make an irrevocable election to report the investment on the balance sheet at fair value. In this case, changes in fair value are recognized in the investor's income statement.

Although equity method income (the proportionate share of the investee's earnings) is reported in the investor's income statement, it is usually excluded from operating income.

**Example: Implementing the equity method**

Assume the following:

- December 31, 20X5, Company P (the investor) invests \$1,000 in return for 30% of the common shares of Company S (the investee).
- During 20X6, Company S earns \$400 and pays dividends of \$100.
- During 20X7, Company S earns \$600 and pays dividends of \$150.

Calculate the effects of the investment on Company P's balance sheet, reported income, and cash flow for 20X6 and 20X7.

**Answer:**

Using the equity method for 20X6, Company P will:

- Recognize \$120 ( $\$400 \times 30\%$ ) in the income statement from its proportionate share of the net income of Company S.
- Increase its investment account on the balance sheet by \$120 to \$1,120, reflecting its proportionate share of the net assets of Company S.
- Receive \$30 ( $\$100 \times 30\%$ ) in cash dividends from Company S and reduce its investment in Company S by that amount to reflect the decline in the net assets of Company S due to the dividend payment.

At the end of 20X6, the carrying value of Company S on Company P's balance sheet will be \$1,090 (\$1,000 original investment + \$120 proportionate share of Company S net income – \$30 dividend received).

For 20X7, Company P will recognize income of \$180 ( $\$600 \times 30\%$ ) and increase the investment account by \$180. Also, Company P will receive dividends of \$45 ( $\$150 \times 30\%$ ) and lower the investment account by \$45. Hence, at the end of 20X7, the carrying value of Company S on Company P's balance sheet will be \$1,225 (\$1,090 beginning balance + \$180 proportionate share of Company S net income – \$45 dividend received).

***Excess of Purchase Price Over Book Value Acquired***

Rarely does the price paid for an investment equal the proportionate book value of the investee's net assets, since the book value of many assets and liabilities is based on historical cost.

At the acquisition date, the excess of the purchase price over the proportionate share of the investee's book value is allocated to the investee's identifiable assets and liabilities based on their fair values. Any remainder is considered goodwill.

In subsequent periods, the investor recognizes expense based on the excess amounts assigned to the investee's assets and liabilities. The expense is recognized consistent with the investee's recognition of expense. For example, the investor might recognize additional depreciation expense as a result of the fair value allocation of the purchase price to the investee's fixed assets.

It is important to note that the purchase price allocation to the investee's assets and liabilities is included in the investor's balance sheet, not the investee's. In addition, the additional expense that results from the assigned amounts is not recognized in the investee's income statement. Under the equity method of accounting, the investor must adjust its balance sheet investment account and the proportionate share of the income reported from the investee for this additional expense.



*Professor's Note: Under the equity method, the investor does not actually report the separate assets and liabilities of the investee. Rather, the investor reports the investment in one line on its balance sheet. This one-line investment account includes the proportionate share of the investee's net assets at fair value and the goodwill.*

#### Example: Allocation of purchase price over book value acquired

At the beginning of the year, Red Company purchased 30% of Blue Company for \$80,000. On the acquisition date, the book value of Blue's identifiable net assets was \$200,000. Also, the fair value and book value of Blue's assets and liabilities were the same except for Blue's equipment, which had a book value of \$25,000 and a fair value of \$75,000 on the acquisition date. Blue's equipment is depreciated over ten years using the straight-line method. At the end of the year, Blue reported net income of \$100,000 and paid dividends of \$60,000.

**Part A:** Calculate the goodwill created as a result of the purchase.

**Part B:** Calculate Red's income at the end of the year from its investment in Blue.

**Part C:** Calculate the the investment in Blue that appears on Red's year-end balance sheet.

**Answer:**

#### Part A

The excess of purchase price over the proportionate share of Blue's book value is allocated to the equipment. The remainder is goodwill.

Purchase price:	\$80,000
Less: Pro-rata book value of net assets:	<u>60,000</u> (\$200,000 book value × 30%)
Excess of purchase price:	\$20,000
Less: Excess allocated to equipment:	<u>15,000</u> [(\$75,000 FV – \$25,000 BV) × 30%]
Goodwill:	\$5,000

**Part B**

Red recognizes its proportionate share of Blue's net income for the year. Also, Red must recognize the additional depreciation expense that resulted from the purchase price allocation.

Red's proportionate share of Blue's net income:	\$30,000	(\$100,000 NI × 30%)
Less: Additional depreciation from excess of purchase price allocated to Blue's equipment:	<u>1,500</u>	(\$15,000 excess / 10 years)
Equity income:	\$28,500	

**Part C**

The beginning balance of Red's investment account is increased by the equity income from Blue and is decreased by the dividends received from Blue.

Investment balance at beginning of year:	\$80,000	(Purchase price)
Equity income:	28,500	(From Part B)
Less: Dividends:	<u>18,000</u>	(\$60,000 × 30%)
Investment balance at end of year:	\$90,500	

*Professor's Note: An alternative method of calculating the year-end investment is as follows:*



$$\begin{aligned} & \% \text{ acquired} \times (\text{book value of net assets beginning of year} + \text{net income} - \text{dividends}) + \text{unamortized excess purchase price} = \\ & [0.3 \times (200,000 + 100,000 - 60,000)] + (20,000 - 1,500) = 90,500 \end{aligned}$$

***Impairments of Investments in Associates***

Equity method investments must be tested for impairment. If the fair value of the investment falls below the carrying value (investment account on the balance sheet) and the decline is considered permanent, the investment is written-down to fair value and a loss is recognized on the income statement. If there is a recovery in value in the future, the asset cannot be written-up.

***Transactions with the Investee***

So far, our discussion has ignored transactions between the investor and investee. Because of its ownership interest, the investor may be able to influence transactions with the investee. Thus, profit from these transactions must be deferred until the profit is confirmed through use or sale to a third party.

Transactions can be described as upstream (investee to the investor) or downstream (investor to the investee). In an upstream sale, the investee has recognized all of the profit in its income statement. However, for profit that is unconfirmed (goods have not

been used or sold by the investor), the investor must eliminate its proportionate share of the profit from the equity income of the investee.

For example, Investor owns 30% of Investee. During the year, Investee sold goods to Investor and recognized \$15,000 of profit from the sale. At year-end, half of the goods purchased from Investee remained in Investor's inventory.

All of the profit is included in Investee's net income. Investor must reduce its equity income of Investee by Investor's proportionate share of the unconfirmed profit. Since half of the goods remain, half of the profit is unconfirmed. Thus, Investor must reduce its equity income \$2,250  $[(\$15,000 \text{ total profit} \times 50\% \text{ unconfirmed}) \times 30\% \text{ ownership interest}]$ . Once the inventory is sold by Investor, \$2,250 of equity income will be recognized.

In a downstream sale, the investor has recognized all of the profit in its income statement. Like the upstream sale, the investor must eliminate the proportionate share of the profit that is unconfirmed.

For example, Investor owns 30% of Investee. During the year, Investor sold \$40,000 of goods to Investee for \$50,000. Investee sold 90% of the goods by year-end.

In this case, Investor's profit is \$10,000 (\$50,000 sales – \$40,000 COGS). Investee has sold 90% of the goods; thus, 10% of the profit remains in Investee's inventory. Investor must reduce its equity income by the *proportionate share* of the unconfirmed profit of \$300  $(\$10,000 \text{ profit} \times 10\% \text{ unconfirmed amount} \times 30\% \text{ ownership interest})$ . Once Investee sells the remaining inventory, Investor can recognize \$300 of profit.

### *Analytical Issues for Investments in Associates*

When an investee is profitable, and its dividend payout ratio is less than 100%, the equity method usually results in higher earnings as compared to the accounting methods used for minority passive investments. Thus, the analyst should consider if the equity method is appropriate for the investor. For example, an investor could use the equity method in order to report the proportionate share of the investee's earnings, when it cannot actually influence the investee.

Also, the investee's individual assets and liabilities are not reported on the investor's balance sheet. The investor simply reports its proportionate share of the investee's equity in one-line on the balance sheet. By ignoring the investee's debt, leverage is lower. In addition, the margin ratios are higher since the investee's revenues are ignored.

Finally, the proportionate share of the investee's earnings are recognized in the investor's income statement, but the earnings may not be available to the investor in the form of cash flow (dividends). That is, the investee's earnings may be permanently reinvested.

## Business Combinations

Under IFRS, business combinations are not differentiated based on the structure of the surviving entity. Under U.S. GAAP, business combinations are categorized as:

- **Merger.** The acquiring firm absorbs all the assets and liabilities of the acquired firm, which ceases to exist. The acquiring firm is the surviving entity.
- **Acquisition.** Both entities continue to exist in a parent-subsidary relationship. Recall that when less than 100% of the subsidiary is owned by the parent, the parent prepares consolidated financial statements but reports the unowned (minority or noncontrolling) interest on its financial statements.
- **Consolidation.** A new entity is formed that absorbs both of the combining companies.
- **Special purpose entities.** A special purpose (or variable interest) entity is typically created for a single purpose by a sponsoring company. The equity investors may lack control and when control effectively remains with the sponsoring company, IFRS requires that the sponsor report the investment by consolidation.

Historically, two accounting methods have been used for business combinations: (1) the purchase method and (2) the pooling-of-interests method. However, over the last few years, the pooling method has been eliminated from U.S. GAAP and IFRS. Now, the **acquisition method** (which replaces the purchase method) is required.

The **pooling-of-interests method**, also known as **uniting-of-interests method** under IFRS, combined the ownership interests of the two firms and viewed the participants as equals—neither firm acquired the other. The assets and liabilities of the two firms were simply combined. Key attributes of the pooling method include the following:

- The two firms are combined using historical book values.
- Operating results for prior periods are restated as though the two firms were always combined.
- Ownership interests continue, and former accounting bases are maintained.

Note that fair values played no role in accounting for a business combination using the pooling method—the actual price paid was suppressed from the balance sheet and income statement. Analysts should be aware that transactions reported under the pooling (uniting-of-interests) method prior to 2001 (2004) may still be reported under that method.

Under the *acquisition method*, all of the assets, liabilities, revenues, and expenses of the subsidiary are combined with the parent. Intercompany transactions are excluded.

In the case where the parent owns less than 100% of the subsidiary, it is necessary to create a noncontrolling (minority) interest account for the proportionate share of the subsidiary's net assets that are not owned by the parent.

Let's look at an example of the acquisition method.

Assume that on January 1, 2010, Company P acquires 80% of the common stock of Company S by paying \$8,000 *in cash* to the shareholders of Company S. The preacquisition balance sheets of Company P and Company S are shown in Figure 3.

Figure 3: Preacquisition Balance Sheets

<b>Preacquisition Balance Sheets</b> <i>January 1, 2010</i>	<i>Company P</i>	<i>Company S</i>
Current assets	\$48,000	\$16,000
Other assets	<u>32,000</u>	<u>8,000</u>
Total	\$80,000	\$24,000
Current liabilities	\$40,000	\$14,000
Common stock	28,000	6,000
Retained earnings	<u>12,000</u>	<u>4,000</u>
Total	\$80,000	\$24,000

Under the equity method of accounting, Company P will report its 80% interest in Company S in a one-line investment account on the balance sheet.

In an acquisition, the assets and liabilities of Company P and Company S are combined, and the stockholders' equity of Company S is ignored. It is also necessary to create a minority interest account for the portion of Company S's equity that is not owned by Company P. Figure 4 compares the acquisition method and the equity method on Company P's post-acquisition balance sheet.

Figure 4: Balance Sheet Comparison of the Acquisition and Equity Methods

<b>Company P Post-Acquisition Balance Sheet</b> <i>January 1, 2010</i>	<i>Acquisition Method</i>	<i>Equity Method</i>
Current assets	\$56,000	\$40,000
Investment in S		8,000
Other assets	<u>40,000</u>	<u>32,000</u>
Total	\$96,000	\$80,000
Current liabilities	\$54,000	\$40,000
Minority interest	2,000	
Common stock	28,000	28,000
Retained earnings	<u>12,000</u>	<u>12,000</u>
Total	\$96,000	\$80,000

Post-acquisition, Company P's current assets are lower by the \$8,000 cash used to acquire 80% of Company S. Under the acquisition method, the current assets are \$56,000 (\$48,000 P current assets + \$16,000 S current assets – \$8,000 cash). With the equity method, current assets are \$40,000 (\$48,000 P current assets – \$8,000 cash).



*Professor's Note: Where does the \$8,000 go? It goes to the departing shareholders from whom the shares were purchased.*

When using the acquisition method, Company P reports 100% of Company S's assets and liabilities even though Company P only owns 80%. The remaining 20% of Company S is owned by minority investors and the difference is accounted for using a noncontrolling (minority) interest account. The minority interest is created by multiplying the subsidiary's equity by the percentage of the subsidiary not owned by the parent. In our example, the minority interest is \$2,000 (\$10,000 S equity × 20%). Noncontrolling interest is reported in stockholders' equity.

Now let's look at the income statements. Figure 5 contains the separate income statements of Company P and Company S for the year ended December 31, 2010.

**Figure 5: Company P and S Income Statements**

<b>Income Statements</b> <i>Year ended December 31, 2010</i>	<i>Company P</i>	<i>Company S</i>
Revenue	\$60,000	\$20,000
Expenses	<u>40,000</u>	<u>16,000</u>
Net income	\$20,000	\$4,000
Dividends paid		\$1,000

Under the equity method, Company P will report its 80% share of Company S's net income in a one-line account in the income statement. Under the acquisition method, the revenue and expenses of Company P and Company S are combined. It is also necessary to create a minority interest in the income statement for the portion of Company S's net income that is not owned by Company P.

Figure 6 compares the income statement effects of the acquisition method and equity method.

**Figure 6: Income Statement Comparison of Acquisition and Equity Methods**

<b>Company P Income Statement</b> <i>Year ended December 31, 2010</i>	<i>Acquisition Method</i>	<i>Equity Method</i>
Revenue	\$80,000	\$60,000
Expenses	<u>56,000</u>	<u>40,000</u>
Operating income	\$24,000	\$20,000
Equity in income of S		3,200
Minority interest	<u>(800)</u>	
Net income	\$23,200	\$23,200



Similar to the consolidated balance sheet, Company P reports 100% of Company S's revenues and expenses even though Company P only owns 80%. Thus, a minority interest is created by multiplying the subsidiary's net income by the percentage of the subsidiary not owned. In our example, the minority interest is \$800 (\$4,000 S net income  $\times$  20%). The minority interest is subtracted in arriving at consolidated net income.

Notice the acquisition method results in higher revenues and expenses, as compared to the equity method, but net income is the same.



*Professor's Note: This example assumed that the parent company acquired its interest in the subsidiary by paying the proportionate share of the subsidiary's book value. If the parent pays more than its proportionate share of book value, the excess is allocated to tangible and intangible assets. The minority interest computation in the example also would be different. This will be covered later in this topic review.*

Under the acquisition method, the purchase price is allocated to the *identifiable* assets and liabilities of the acquired firm on the basis of fair value. Any remainder is reported on the balance sheet as goodwill. Goodwill is said to be an *unidentifiable* asset that cannot be separated from the business.

Under U.S. GAAP, goodwill is the amount by which the fair value of the subsidiary is greater than the fair value of the acquired company's identifiable assets (*full goodwill*). Under IFRS, goodwill is the excess of the purchase price over the fair value of the acquiring company's proportion of the acquired company's identifiable assets (*partial goodwill*). However, IFRS permits the use of the full goodwill approach.

Let's look at an example of calculating acquisition goodwill.

**Example: Goodwill**

Wood Corporation paid \$600 million for all of the outstanding stock of Pine Corporation. At the acquisition date, Pine reported the condensed balance sheet below:

**Pine Corporation Condensed Balance Sheet**

	<i>Book Value (in millions)</i>
Current assets	\$80
Plant and equipment, net	760
Goodwill	30
Liabilities	400
Stockholders' equity	470

The fair value of the plant and equipment was \$120 million more than its recorded book value. The fair values of all other identifiable assets and liabilities were equal to their recorded book values. Calculate the amount of goodwill Wood should report in its consolidated balance sheet.

**Answer:**

(in millions)

Purchase price	\$600
Current assets	\$80
Plant and equipment, net	880
Liabilities	<u>(400)</u>
Less: Fair value of net assets	<u>560</u>
Acquisition goodwill	<u>\$40</u>

Goodwill is equal to the excess of purchase price over the fair value of identifiable assets and liabilities acquired. The plant and equipment was *written-up* by \$120 million to reflect fair value. The goodwill reported on Pine's balance sheet is an unidentifiable asset and is thus ignored in the calculation of Wood's goodwill.

**Example: Full goodwill vs. partial goodwill**

Continuing the previous example, assume Wood paid \$450 million for 75% of the stock of Pine. Calculate the amount of goodwill Wood should report using the full goodwill method and the partial goodwill method.

**Answer:**

*Full goodwill method:*

Wood's balance sheet goodwill is the excess of the fair value of the subsidiary (\$450 million / 0.75 = \$600 million) over the fair value of identifiable net assets acquired, just as in the example above. Acquisition goodwill = \$40 million.

*Partial goodwill method:*

Wood's balance sheet goodwill is the excess of the acquisition price over Wood's proportionate share of the fair value of Pine's identifiable net assets:

Purchase price	\$450 million
Less: 75% of fair value of net assets	$0.75 \times \$560 = \underline{\$420 \text{ million}}$
Acquisition goodwill	\$30 million

Goodwill is lower using the partial goodwill method. How is this reflected on the liabilities-and-equity side of the balance sheet?

The value of *noncontrolling interest* also depends on which method is used. If the full goodwill method is used, noncontrolling interest is based on the acquired company's fair value. If the partial goodwill method is used, noncontrolling interest is based on the fair value of the acquired company's identifiable assets.

In the example above, noncontrolling interest using the full goodwill method is 25% of Wood's fair value of \$600 million, or \$150 million. Using the partial goodwill method, noncontrolling interest is 25% of the fair value of Pine's identifiable net assets, or \$140 million. The difference of \$10 million balances the \$10 million difference in goodwill.

The full goodwill method results in higher total assets and higher total equity than the partial goodwill method. Thus, return on assets and return on equity will be lower if the full goodwill method is used.

Goodwill is not amortized. Instead, it is tested for impairment at least annually. Impairment occurs when the carrying value exceeds the fair value. However, measuring the fair value of goodwill is complicated by the fact that goodwill cannot be separated from the business. Because of its inseparability, goodwill is valued at the reporting unit level.

Under IFRS, testing for impairment involves a single step approach. If the carrying amount of the cash generating unit (where the goodwill is assigned) exceeds the recoverable amount, an impairment loss is recognized.

Under U.S. GAAP, goodwill impairment potentially involves two steps. In the first step, if the carrying value of the reporting unit (including the goodwill) exceeds the fair value of the reporting unit, an impairment exists.

Once it is determined the goodwill is impaired, the loss is measured as the difference in the carrying value of the goodwill and the *implied* fair value of the goodwill. The impairment loss is recognized in the income statement as a part of continuing operations.



*Professor's Note: Notice the impairment test for goodwill is based on the decline in value of the reporting unit, while the loss is based on the decline in value of the goodwill.*

The *implied* fair value of the goodwill is calculated in the same manner as goodwill at the acquisition date. That is, the fair value of the reporting unit is allocated to the identifiable assets and liabilities as if they were acquired on the impairment measurement date. Any excess is considered the *implied* fair value of the goodwill.

Let's look at an example.

#### Example: Impaired goodwill

Last year, Parent Company acquired Sub Company for \$1,000,000. On the date of acquisition, the fair value of Sub's net assets was \$800,000. Thus, Parent reported acquisition goodwill of \$200,000 (\$1,000,000 purchase price – \$800,000 fair value of Sub's net assets).

At the end of this year, the fair value of Sub is \$950,000, and the fair value of Sub's net assets is \$775,000. Assuming the carrying value of Sub is \$980,000, determine if an impairment exists and calculate the loss if applicable under U.S. GAAP.

#### Answer:

Since the carrying value of Sub exceeds the fair value of Sub (\$980,000 carrying value > \$950,000 fair value), an impairment exists.

In order to measure the impairment loss, the implied goodwill must be compared to the carrying value of the goodwill. At the impairment measurement date, the implied value of the goodwill is \$175,000 (\$950,000 fair value of Sub – \$775,000 fair value of Sub's net assets). Since the carrying value of the goodwill exceeds the implied value of the goodwill, an impairment loss of \$25,000 is recognized (\$200,000 goodwill carrying value – \$175,000 implied goodwill) thereby reducing goodwill to \$175,000.

## Joint Ventures

Recall that a joint venture is an entity whereby control is shared by two or more investors. Joint ventures are created in various legal, operating, and accounting forms and are often used to invest in foreign markets, special projects, or risky ventures.

Under IFRS, **proportionate consolidation** is the preferred accounting method for joint ventures, although the equity method is permitted. Under U.S. GAAP, the equity method is required except in very limited situations, primarily unincorporated entities in the construction industry.

Proportionate consolidation is similar to a business acquisition, except the investor only reports the proportionate share of the assets, liabilities, revenues, and expenses of the joint venture. Since only the proportionate share is reported, no minority owners' interest is necessary.

Let's return to our earlier acquisition example. Recall that Company P acquired 80% of Company S on January 1, 2010, for \$8,000 cash. Figure 7 compares the proportionate consolidation method and the equity method on the post-acquisition balance sheet of Company P.

**Figure 7: Balance Sheet Comparison of Proportionate Consolidation and Equity Methods**

<b>Company P Post-Acquisition Balance Sheet January 1, 2010</b>	<i>Proportionate Consolidation Method</i>	<i>Equity Method</i>
Current assets	\$52,800	\$40,000
Investment in S		8,000
Other assets	<u>38,400</u>	<u>32,000</u>
Total	\$91,200	\$80,000
Current liabilities	\$51,200	\$40,000
Common stock	28,000	28,000
Retained earnings	<u>12,000</u>	<u>12,000</u>
Total	\$91,200	\$80,000

Under proportionate consolidation, Company P's current assets are \$52,800 [\$48,000 P current assets – \$8,000 cash paid + (\$16,000 S current assets × 80%)].

With proportionate consolidation, Company P reports its 80% share of each of Company S's assets and liabilities. No minority ownership interest is necessary. Just like a regular consolidation, Company S's equity is ignored.

Notice that proportionate consolidation results in higher assets and liabilities, as compared to the equity method, but stockholders' equity is the same.

**Figure 8: Income Statement Comparison of Proportionate Consolidation and Equity Methods**

<b>Company P Income Statement</b> <i>Year ended December 31, 2010</i>	<i>Proportionate Consolidation Method</i>	<i>Equity Method</i>
Revenue	\$76,000	\$60,000
Expenses	<u>52,800</u>	<u>40,000</u>
Operating income	\$23,200	\$20,000
Equity in income of S	<u>          </u>	<u>3,200</u>
Net income	\$23,200	\$23,200

With proportionate consolidation, Company P reports its 80% share of Company S's revenues and expenses. Once again, no minority ownership interest is necessary.

Notice that proportionate consolidation results in higher revenues and expense as compared to the equity method, but net income is the same.

### Special Purpose and Variable Interest Entities

A special purpose entity (SPE) is a legal structure created to isolate certain assets and liabilities of the sponsor. An SPE can take the form of a corporation, partnership, joint venture, or trust. The typical motivation is to reduce risk and thereby lower the cost of financing.

Prior to recently issued accounting standards, SPEs were often maintained off-balance-sheet, thereby enhancing the sponsor's financial statements and ratios.

The FASB uses the term variable interest entity (VIE) to describe a special purpose entity that meets certain conditions. According to FIN No. 46(R) "*Consolidation of Variable Interest Entities*," a VIE is an entity that has one or both of the following characteristics:

1. At-risk equity that is insufficient to finance the entity's activities without additional financial support.
2. Equity investors that lack any one of the following:
  - Decision making rights.
  - The obligation to absorb expected losses.
  - The right to receive expected residual returns.

If an SPE is considered a VIE, it must be consolidated by the primary beneficiary. The primary beneficiary is the entity that absorbs the majority of the risks or receives the majority of the rewards.

The IASB continues to use the term special purpose entity. According to SIC No. 12 "*Consolidation—Special Purpose Entities*," the sponsoring entity must consolidate if it controls the SPE. Indications of control include a sponsoring entity that:

- Benefits from the SPE's activities.
- Has decision making rights to receive benefits from the SPE.

- Absorbs the risks and rewards of the SPE.
- Has a residual interest in the SPE.

### *Asset Securitizations*

SPEs are often created to securitize assets, usually receivables of the sponsor. Typically, the SPE issues debt to purchase the receivables from the sponsor and the debt is repaid as the receivables are collected.

When the receivables are securitized, the sponsor removes the receivables from the balance sheet and reports the cash inflow as an operating activity in the cash flow statement. If the sponsor still has recourse, the transaction is nothing more than a collateralized borrowing. In this case, the analyst should consider making adjustments to the sponsor's operating cash flow and leverage.

### *Qualifying Special Purpose Entities*

Prior to recent revisions in FIN 46 and SFAS 140, U.S. GAAP permitted a sponsor to avoid consolidating asset securitizations by creating a qualifying special purpose entity (QSPE). IFRS did not permit QSPEs.

A QSPE could only hold financial assets, usually receivables that were transferred from the sponsor. As a legally separate, independent entity, the QSPE had total control of the assets. The sponsor was not expected to receive a beneficial interest, and the sponsor's financial risk was limited to its initial investment or recourse obligation; that is, the sponsor was beyond the reach of bankruptcy. If these conditions were not met, the entity was not considered a QSPE.

When the sponsor removed the transferred assets from its balance sheet, gain or loss could be recognized in some cases.

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### **LOS 23.c: Analyze the effects on financial ratios of the different methods used to account for intercorporate investments.**

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The effects of the choice of accounting methods on reported financial results have been covered earlier in this topic review, so we won't repeat the discussion here. Instead, we'll compare the effects of the equity method, the acquisition method, and the proportionate consolidation method on leverage and profitability (as measured by net profit margin, ROE, and ROA).

There are four important effects on the balance sheet and income statement items that result from the choice of accounting method (in most situations):

1. All three methods report the same net income.
2. Equity and proportionate consolidation report the same equity. Acquisition method equity will be higher by the amount of minority interest.
3. Assets and liabilities are highest under the acquisition method and lowest under the equity method; proportionate consolidation is in-between.
4. Sales are highest under the acquisition method and lowest under the equity method; proportionate consolidation is in-between.

Usually, the equity method provides the most favorable results, acquisition the least favorable, with proportionate consolidation somewhere in-between, as shown in Figure 9.

**Figure 9: Reported Financial Results from Different Accounting Methods**

	<i>Equity Method</i>	<i>Proportionate Consolidation</i>	<i>Acquisition Method</i>
Leverage	Lower (more favorable)—liabilities are lower and equity is the same	In-between	Higher
Net profit margin	Higher—sales are lower and net income is the same	In-between	Lower
ROE	Higher—equity is lower and net income is the same	Same	Lower
ROA	Higher—net income is the same and assets are lower	In-between	Lower



## KEY CONCEPTS

### LOS 23.a

Accounting for investments:

<i>Ownership</i>	<i>Degree of Influence</i>	<i>Accounting Treatment</i>
Less than 20% (Investments in financial assets)	No significant influence	Held-to-maturity, held-for-trading, available-for-sale, or designated at fair value
20%–50% (Investments in associates)	Significant influence	Equity method
More than 50% (Business combinations)	Control	Acquisition method
50% / 50% (Joint venture)	Shared control	IFRS: Proportionate consolidation preferred U.S. GAAP: Equity method

Investments in financial assets: Dividends and interest income are recognized in the investor's income statement. Held-to-maturity securities are reported on the balance sheet at amortized cost. Subsequent changes in fair value are ignored. Held-for-trading securities are reported at fair value, and the unrealized gains and losses are recognized in the income statement. Available-for-sale securities are also reported at fair value, but the unrealized gains and losses are reported in stockholders' equity.

Investments in associates: With the equity method, the proportionate share of the investee's earnings increase the investor's investment account on the balance sheet and are recognized in the investor's income statement. Dividends received reduce the investment account. Dividends received are not recognized in the investor's income statement under the equity method.

Business combinations: In an acquisition, all of the assets, liabilities, revenues, and expenses of the subsidiary are combined with the parent. Intercompany transactions are excluded. When the parent owns less than 100% of the subsidiary, it is necessary to create a noncontrolling interest account for the proportionate share of the subsidiary's net assets and net income that is not owned by the parent.

Joint ventures: Proportionate consolidation is similar to a business combination, except the investor only includes the proportionate share of the assets, liabilities, revenues, and expenses of the joint venture. No minority owners' interest is required.

Under IFRS, the sponsor of a special purpose entity (SPE) must consolidate the SPE if their economic relationship indicates that the sponsor controls the SPE. U.S. GAAP requires that a variable interest entity (VIE) must be consolidated by its primary beneficiary.

**LOS 23.b**

Differences between IFRS and U.S. GAAP treatment of intercorporate investments include:

- Unrealized foreign exchange gains and losses on available-for-sale securities are recognized on the income statement under IFRS and as other comprehensive income under U.S. GAAP.
- U.S. GAAP categorizes business combinations as mergers (acquired company ceases to exist), acquisitions (acquired company continues to exist as a subsidiary), or consolidations (new company is formed and both old companies cease to exist). IFRS does not distinguish between types of business combinations.
- IFRS permits either the partial goodwill or full goodwill method to value goodwill and noncontrolling interest in business combinations. U.S. GAAP requires the full goodwill method.
- U.S. GAAP requires equity method accounting for joint ventures. Under IFRS, proportionate consolidation is preferred but the equity method is permitted.

**LOS 23.c**

The effects of the equity method, acquisition method, and the proportionate consolidation method on leverage and profitability:

- All three methods report the same net income.
- Equity and proportionate consolidation report the same equity. Acquisition method equity will be higher by the amount of minority interest.
- Assets and liabilities are highest under the acquisition method and lowest under the equity method; proportionate consolidation is in-between.
- Sales are highest under the acquisition method and lowest under the equity method; proportionate consolidation is in-between.

## CONCEPT CHECKERS

1. Tall Company owns 30% of the common equity of Short Incorporated. Tall has been unsuccessful in its attempts to obtain representation on Short's board of directors. For financial reporting purposes, Tall's ownership interest is *most likely* considered a(n):
  - A. investment in financial assets.
  - B. investment in associates.
  - C. business combination.
2. If a company uses the equity method to account for an investment in another company:
  - A. income is combined to the extent of ownership.
  - B. all income of the affiliate is included except intercompany transfers.
  - C. earnings of the affiliate are included but reduced by any dividends paid to the company.

Use the following information to answer Questions 3 through 7.

Kirk Company acquired shares in the equity of both Company A and Company B. We have the following information from the public market about Company A and Company B's investment value at the time of purchase and at two subsequent dates:

Security	Cost	$t = 1$	$t = 2$
A	\$950	\$850	\$900
B	250	180	350

3. Kirk Company will report the initial value of its investment in financial assets as:
  - A. \$1,030.
  - B. \$1,200.
  - C. \$1,250.
4. At  $t = 1$ , Kirk will:
  - A. carry the financial assets at cost.
  - B. write down the financial assets to \$1,030 and recognize an unrealized loss of \$170.
  - C. write down the financial assets to \$1,030 and recognize a realized loss of \$170.
5. At  $t = 2$ , Kirk will report the carrying value of its financial assets as:
  - A. \$1,030.
  - B. \$1,200.
  - C. \$1,250.

6. Based on the information provided, which of the following statements is *most accurate*?
- A. Classifying the shares as trading securities would result in greater reported earnings volatility for Kirk.
  - B. Classifying the shares as available-for-sale securities would result in a \$220 realized gain for Kirk between  $t = 1$  and  $t = 2$ .
  - C. It is optimal for Kirk to classify its shares in Company A and Company B as available-for-sale securities since it results in a net \$50 gain recognized on the income statement at  $t = 2$ .
7. Assume for this question only that Security A and Security B are both debt securities held-to-maturity. At  $t = 2$ , Kirk will report the carrying value of these securities as:
- A. \$1,030.
  - B. \$1,200.
  - C. \$1,250.

Use the following information to answer Questions 8 through 10.

Assume Company P acquired 40% of the shares of Company A for \$1.5 million on January 1, 2007. During the year, Company A earned \$500,000 and paid dividends of \$125,000.

8. At the end of 2007, Company P reported investment in Company A as:
- A. \$1.5 million.
  - B. \$1.65 million.
  - C. \$1.7 million.
9. Company P reported investment income of:
- A. \$50,000.
  - B. \$150,000.
  - C. \$200,000.
10. Company P received cash flow from the investee of:
- A. \$50,000.
  - B. \$150,000.
  - C. \$200,000.

Use the following information to answer Questions 11 through 13.

Assume Company P acquires 80% of the common stock of Company S on December 31, 2008, by paying \$120,000 cash to the shareholders of Company S. The two firms' pre-acquisition balance sheets as of December 31, 2008, and income statements for the year ending December 31, 2009, follow:

<b>Pre-Acquisition Balance Sheets</b>		
<i>December 31, 2008</i>	<b>Company P</b>	<b>Company S</b>
Current assets	\$720,000	\$240,000
Other assets	480,000	120,000
<b>Total Assets</b>	<b>\$1,200,000</b>	<b>\$360,000</b>
Current liabilities	\$600,000	\$210,000
Common stock	420,000	90,000
Retained earnings	180,000	60,000
<b>Total Liabilities &amp; Equity</b>	<b>\$1,200,000</b>	<b>\$360,000</b>
 <b>Unconsolidated Income Statements</b>		
<i>December 31, 2009</i>	<b>Company P</b>	<b>Company S</b>
Revenue	\$900,000	\$300,000
Expenses	600,000	240,000
<b>Net income</b>	<b>\$300,000</b>	<b>\$60,000</b>
Dividends		\$15,000

11. Immediately after the acquisition, Company P will report total assets of:
  - A. \$1,080,000.
  - B. \$1,440,000.
  - C. \$1,560,000.
12. For the year ended December 31, 2009, Company P's consolidated net income is:
  - A. \$300,000.
  - B. \$348,000.
  - C. \$360,000.
13. On its December 31, 2009, consolidated balance sheet, Company P should report a minority ownership interest of:
  - A. \$0.
  - B. \$39,000.
  - C. \$42,000.

Use the following information to answer Questions 14 and 15.

Company M acquired 20% of Company N for \$6 million on January 1, 2009.  
Company N's debt and equity securities are publicly traded on an organized exchange.  
Company N reported the following for the year ended 2009:

Year	Net income (loss)	Dividends
2009	(\$450,000)	\$600,000

14. If Company M can significantly influence Company N, what is the balance sheet carrying value of Company M's investment at the end of 2009?
  - A. \$5,790,000.
  - B. \$5,970,000.
  - C. \$6,000,000.
15. If Company M can significantly influence Company N, what amount of income should Company M recognize from its investment for the year ended 2009?
  - A. (\$90,000).
  - B. (\$210,000).
  - C. \$30,000.

Use the following information to answer Questions 16 through 18.

Company C owns a 50% interest in a joint venture, JVC, and accounts for it using the equity method. They have each reported the following 2009 financial results.

Balance Sheets	Company C	JVC
Cash	\$1,550	\$300
Accounts receivable	3,500	700
Inventory	3,000	800
Fixed assets	5,000	2,600
Investment in JVC	400	
<b>Total assets</b>	<b>\$13,450</b>	<b>\$4,400</b>
Accounts payable	\$3,500	\$1,200
Long-term debt	4,000	2,400
Equity	5,950	800
<b>Total liabilities and equity</b>	<b>\$13,450</b>	<b>\$4,400</b>

Income Statements	Company C	JVC
Revenues	\$17,430	\$2,800
Equity in JVC earnings	100	
Cost of goods sold	7,000	2,000
Other expenses	9,600	600
<b>Net income</b>	<b>\$930</b>	<b>\$200</b>

16. Assuming proportionate consolidation, Company C's stockholders' equity at the end of 2009 is *closest* to:
- \$5,950.
  - \$6,350.
  - \$6,750.
17. Assuming proportionate consolidation, Company C's total assets at the end of 2009 is *closest* to:
- \$15,250.
  - \$15,650.
  - \$17,850.
18. Assuming proportionate consolidation, Company C's cost of goods sold and net income for the year ended 2009 are *closest* to:
- |    |                           |                   |
|----|---------------------------|-------------------|
|    | <u>Cost of goods sold</u> | <u>Net income</u> |
| A. | \$8,000                   | \$930             |
| B. | \$7,000                   | \$930             |
| C. | \$8,000                   | \$830             |
19. According to U.S. GAAP, goodwill is considered impaired if the:
- implied goodwill at the measurement date exceeds the carrying value of goodwill.
  - carrying value of the reporting unit is greater than fair value of the reporting unit.
  - goodwill can be separated from the business and valued separately.
20. Adam Corporation acquired Hardy Corporation recently using the acquisition method. Adam is preparing to report its year-end results to include Hardy according to IFRS. Which of the following statements regarding goodwill is *most accurate*?
- Adam would amortize its goodwill over no more than 20 years.
  - Adam would test its goodwill annually to ensure the carrying value is not greater than the fair value.
  - Adam would test its goodwill annually to ensure the fair value is not greater than the carrying value.

21. According to U.S. GAAP, which of the following statements about the method used to account for a joint venture whereby each party owns 50% is *most accurate*?
- The investor can choose between the proportionate consolidation method and the equity method.
  - The equity method is required.
  - The consolidation method is required.
22. A company accounts for its investment in a subsidiary using the equity method. The reported net profit margin is 14%. An analyst adjusts the financials to reflect consolidation and determines that the adjusted net profit margin is 8%. The net profit margin based on proportionate consolidation is *most likely* to be:
- less than 8%.
  - more than 14%.
  - between 8% and 14%.
23. A company accounts for its investment in a subsidiary using the equity method. The reported return on equity (ROE) is 21%, and return on assets (ROA) is 14%. An analyst adjusts the financials to reflect proportionate consolidation. ROE based on proportionate consolidation is *most likely* to be:
- less than 14%.
  - between 14% and 21%.
  - equal to 21%.

## CHALLENGE PROBLEMS

24. Selected operating results for Lowdown, Inc., in 2008 and 2009 are shown in the following table:

<i>Lowdown, Inc.</i>	<i>2008</i>	<i>2009</i>
Sales and operating revenues	\$1,000	\$1,140
Investment income	<u>\$45</u>	<u>\$160</u>
Total revenues	1,045	1,300
Operating costs	<u>500</u>	<u>640</u>
Pre-tax operating income	545	660

Martha Patterson, an analyst with Cauldron Associates, has been assigned the task of separating Lowdown's operating and investment results. She intends to do this by removing the effects of the returns on Lowdown's marketable securities portfolio and forecasting operating income for 2010. Patterson assumes that growth trend in operating income from 2008 to 2009 will continue in 2010.

The appropriate forecast of Lowdown's operating income in 2010 based on Patterson's analysis is *closest* to:

- \$500.
- \$650.
- \$700.



25. Lowdown, Inc., uses the proportionate consolidation method to report the results of its investment in Highbrow Company because it controls 50% of the voting shares. Highbrow has reported positive net income in each of the last five years. Martha Patterson, an analyst with Cauldron Associates, determines that the equity method more appropriately captures the economics of the relationship between Lowdown and Highbrow and adjusts consolidated statements of Lowdown to reflect the equity method. Don Reilly, her supervisor, disagrees with her analysis; he argues that the proportionate consolidation method is appropriate in this case because the equity method will overstate Lowdown's operating performance and financial condition; in particular, he argues that net profit margin and return on assets will be overstated.

Is Reilly correct in his assessment of the effect of Patterson's adjustments on:

	<u>Net profit margin?</u>	<u>Return on assets?</u>
A. Yes		Yes
B. No		Yes
C. No		No

## ANSWERS – CONCEPT CHECKERS

1. A Usually an ownership interest between 20% and 50% would indicate the ability to significantly influence. However, in this case, Tall is unable to influence Short as evidenced by its failure to obtain board representation; thus, Tall's ownership interest should be considered an investment in financial assets.
2. A With the equity method, the proportional share of the affiliate's income (% ownership × affiliate earnings) is reported on the investor's income statement.
3. B Initially, the carrying value of all security investments is cost.  
  
initial cost =  $\$950 + 250 = \$1,200$
4. B Both available-for-sale and trading securities are carried at market value on the balance sheet. Also, both classifications call for recognition of unrealized losses and gains. Market value at  $t = 1$  is  $\$850 + \$180 = \$1,030$ . Unrealized loss is  $(\$850 - \$950) + (\$180 - \$250) = -\$170$ . Note that the recognition differs. With available-for-sale securities, the recognition is only on the balance sheet. With trading securities, the recognition impacts the income statement.
5. C The increase in value requires that investment securities be written up to  $\$900 + \$350 = \$1,250$ .
6. A Classifying the shares as trading requires both realized and unrealized gains and losses to be recognized on the income statement. As a result, this would have the effect of greater reported earnings volatility. There is actually a \$220 *unrealized* gain between  $t = 1$  and  $t = 2$ ; the gain is unrealized because the shares were not actually sold. The net gain of \$50 between the acquisition date and  $t = 2$  is unrealized; therefore, by classifying as available-for-sale, the gain is not recognized on the income statement (it goes directly to equity). Classification as either trading or available-for-sale securities results in the same fair market value of \$1,250 reported on the balance sheet at  $t = 2$ .
7. B Debt securities held-to-maturity are securities that a company has the positive intent and ability to hold to maturity. They are carried at amortized cost (\$1,200), and no unrealized or realized gains or losses are recognized until disposition.
8. B  $\$1,500,000 + 0.4(\$500,000 - \$125,000) = \$1,650,000$ .
9. C  $\$500,000 \times 0.4 = \$200,000$ ; dividends are not included in income under the equity method.
10. A  $\$125,000 \times 0.4 = \$50,000$ ; the dividend is cash flow = \$50,000.
11. B Total assets =  $\$1,200,000 + \$360,000 - \$120,000 = \$1,440,000$ .
12. B Minority interest income =  $\$60,000(0.2) = \$12,000$ .

Consolidated net income (after minority interest income is subtracted) =  $\$300,000 + \$60,000 - \$12,000 = \$348,000$ .

13. **B** The beginning balance of the minority interest is \$30,000 ( $\$150,000 \text{ S equity} \times 20\%$ ). The minority interest is increased by the minority share of Company S's income of \$12,000 ( $\$60,000 \times 20\%$ ) and is decreased by the minority share of the dividends paid by Company S of \$3,000 ( $\$15,000 \times 20\%$ ). Thus, the ending balance is \$39,000 ( $\$30,000 + \$12,000 - \$3,000$ ).
14. **A**  $\$6,000,000 + 0.2(-\$450,000) - 0.2(\$600,000) = \$5,790,000$ .
15. **A**  $0.2(-\$450,000) = -\$90,000$ .
16. **A** Company C's stockholders' equity of \$5,950 is not affected by the use of proportionate consolidation.
17. **A**  $\$13,450 \text{ Company C total assets} - \$400 \text{ investment in JVC} + (\$4,400 \text{ JVC total assets} \times 0.50 \text{ ownership interest}) = \$15,250$ .
18. **A**  $\text{COGS} = \$7,000 \text{ Company C} + (\$2,000 \text{ JVC} \times 0.50 \text{ ownership interest}) = \$8,000$ .  
Net income of \$930 is not affected by the proportionate consolidation.
19. **B** In testing goodwill for impairment, the carrying value of the reporting unit (including goodwill) is compared to the fair value of the reporting unit. Once an impairment has been detected, the loss is equal to the difference in the book value of the goodwill and the implied value of the goodwill.
20. **B** Adam is required to perform an annual impairment test. The carrying value cannot exceed the fair value; if it does, then an impairment has taken place and the goodwill must be written down.
21. **B** Under IFRS, companies have the choice of accounting for investments in joint ventures in which they own 50% of the shares using either the equity method or proportionate consolidation. Under U.S. GAAP, the equity method is required.
22. **C** The equity method typically yields the highest measure of net profit margin and consolidation the lowest. Proportionate consolidation is most likely to result in a net profit margin somewhere between the two.
23. **C** Both equity and proportionate consolidation report the same net income and equity, so ROE is the same.

## ANSWERS – CHALLENGE PROBLEMS

24. A After removing the investment gains in 2008 and 2009, operating income is \$500 each year. Based on a growth trend of 0%, the appropriate operating income forecast for 2010 is also \$500.

	2008	2009
Sales and operating revenues	\$1,000	\$1,140
Operating costs	500	640
Adjusted operating income	500	500

25. A Reilly is correct in his assessment of the effect of the application of the equity method on net profit margin and return on assets. Under the equity method (as compared to proportionate consolidation), net income will be the same but sales will be lower, resulting in higher profit margin. Similarly, under the equity method, total assets will be lower (as compared to proportionate consolidation), resulting in higher ROA.

# EMPLOYEE COMPENSATION: POST-EMPLOYMENT AND SHARE-BASED

Study Session 6

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## EXAM FOCUS

This is a complicated topic, but don't be intimidated. The economics of pension plan accounting are not too difficult to grasp, but the accounting for pension plans is extremely complex. Please note that U.S. pension accounting standards changed in December 2006. IFRS has not yet changed so make sure you can adjust the financial statements for comparison purposes. You should be able to explain how reported results are affected by management's assumptions regarding the discount rate, the rate of compensation growth, and the expected rate of return on plan assets. You should also be able to adjust the reported financial results for economic reality by calculating economic pension expense. Share-based compensation is also introduced. Compensation expense is based on fair value on the grant date, and it is often necessary to use an option pricing model to estimate fair value. Make sure you understand the effects of changing the model inputs on fair value.

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## LOS 24.a: Discuss the types of post-employment benefit plans and the implications for financial reports.

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A pension is a form of deferred compensation earned over time through employee service. The most common pension arrangements are defined-contribution plans and defined-benefit plans.

A **defined-contribution plan** is a retirement plan whereby the firm contributes a certain sum each period to the employee's retirement account. The firm's contribution can be based on any number of factors including years of service, the employee's age, compensation, profitability, or even a percentage of the employee's contribution. In any event, the firm makes no promise to the employee regarding the future value of the plan assets. The investment decisions are left to the employee, who assumes all of the investment risk.

The financial reporting requirements for defined-contribution plans are straightforward. Pension expense is simply equal to the employer's contribution. There is no future obligation to report on the balance sheet. The remainder of this topic review will focus on accounting for a defined-benefit plan.

In a **defined-benefit plan**, the firm promises to make periodic payments to the employee after retirement. The benefit is usually based on the employee's years of service and the employee's compensation at, or near, retirement. For example, an employee might earn a retirement benefit of 2% of her final salary for each year of service. Consequently, an

employee with 20 years of service and a final salary of \$100,000 would receive \$40,000 ( $\$100,000 \text{ final salary} \times 2\% \times 20 \text{ years of service}$ ) each year upon retirement until death.

Since the employee's future benefit is defined, the employer assumes the investment risk.

Financial reporting for a defined-benefit plan is much more complicated than a defined-contribution plan because the employer must estimate the value of the future obligation to its employees. This involves forecasting a number of variables such as future compensation levels, employee turnover, retirement age, mortality rates, and an appropriate discount rate.

A company that offers defined pension benefits usually funds the plan by contributing assets to a separate legal entity, usually a trust. The plan assets are managed to generate the income and principal growth necessary to pay the pension benefits as they come due.

The difference in the benefit obligation and the plan assets is referred to as the funded status of the plan. If the plan assets exceed the pension obligation, the plan is said to be "overfunded." Conversely, if the pension obligation exceeds the plan assets, the plan is "underfunded."

**Other post-employment benefits**, primarily healthcare benefits for retired employees, are similar to a defined-benefit pension plan. The future benefit is defined today but is based on a number of unknown variables. For example, in a post-employment healthcare plan, the employer must forecast healthcare costs that are expected once the employee retires.

Funding is an area where other post-employment benefit plans differ from defined-benefit pension plans. Pension plans are usually funded at some level, while other post-employment benefit plans are usually unfunded. In the case of an unfunded plan, the employer recognizes expense in the income statement as the benefits are earned; however, the employer's cash flow is not affected until the benefits are actually paid to the employee.

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**LOS 24.b: Explain the measures of a defined benefit pension plan's liability (i.e., defined benefit obligation and projected benefit obligation).**

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There are three different measures of the pension obligation under U.S. GAAP:

1. The **projected benefit obligation (PBO)** is the actuarial present value (at an assumed discount rate) of all future pension benefits earned to date, *based on expected future salary increases*. It measures the value of the obligation, assuming the firm is a going concern and that the employees will continue to work for the firm until they retire.

2. The **accumulated benefit obligation** (ABO) is the actuarial present value of all future pension benefits earned to date based on current salary levels, *ignoring future salary increases*. It is an estimate of the pension liability on a current basis, which is relevant if the company expects to liquidate and settle (i.e., pay off) its pension obligation. If the pension benefits are based on a non-pay related plan (e.g., the employee earns a fixed amount for each year of service), the ABO and PBO are the same.
3. The **vested benefit obligation** (VBO) is the amount of the ABO that is not contingent on future service. Most companies require that employees work for a specified period of time before they are entitled to full pension benefits. For example, a company may use a 4-year vesting schedule whereby the employee earns 25% of the pension benefit each year. After four years, the employee is fully vested, which means the employee is entitled to all pension benefits accrued to date.

From one period to the next, all three measures of the benefit obligation change as a result of current service cost, interest cost, past (prior) service cost, actuarial assumptions, and benefits paid to employees.

**Current service cost** is the present value of benefits earned by the employees during the current period. For the PBO, service cost includes an estimate of compensation growth (future salary increases).

**Interest cost** is the increase in the obligation due to the passage of time. Benefit obligations are discounted obligations; thus, interest accrues on the obligation each period. Interest cost is equal to the pension obligation at the beginning of the period multiplied by the discount rate.

**Past (prior) service costs** are retroactive benefits awarded to employees when a plan is initiated or amended.



*Professor's Note: Employers may also terminate benefit plans or curtail (reduce) benefits. However, terminations and curtailments are beyond the scope of this topic review.*

**Changes in actuarial assumptions** are the gains and losses that result from changes in variables such as mortality, employee turnover, retirement age, and the discount rate. An actuarial gain will decrease the benefit obligation and an actuarial loss will increase the obligation.

**Benefits paid** reduce the obligation to the employees.

We can reconcile the beginning and ending balance of the benefit obligation as follows:

Obligation at beginning of period	
+ Current service cost	
+ Interest cost	
+ Plan amendments	
± Actuarial (gains) and losses	
– Benefits paid	
= Obligation at end of period	

Consider the following example of calculating the PBO.

John McElwain was hired on January 1, 2008, as the only employee of Transfer Trucking, Inc., and is eligible to participate in the company's defined-benefit pension plan. Under the plan, he is promised an annual payment of 2% of his final annual salary for each year of service. The pension benefit will be paid at the end of each year, beginning one year after retirement. McElwain's starting annual salary is \$50,000.

### Calculating the PBO for 2008

Remember that the PBO is the present value of the benefits McElwain is expected to receive during retirement. In order to calculate the PBO at the end of the first year, we will assume the following:

- The **discount rate** is 8%.
- McElwain's salary will increase by 4% per year (this is called the **rate of compensation growth**).
- McElwain will work for 25 years.
- McElwain will live for 15 years after retirement and receive 15 annual pension benefit payments.

Based on a starting salary of \$50,000 in 2008 and 4% annual pay increases over 24 years, McElwain's salary at retirement will be \$128,165.21. (If McElwain works for 25 years, he will receive 24 pay increases.)

If McElwain is expected to earn \$128,165.21 in his last year of employment (2032), he will be entitled to an annual end-of-year pension payment equal to 2% of his final salary for each year of service. Thus, at the end of one year of service, McElwain's benefit is \$2,563.30 per year from retirement until death ( $\$128,165.21 \times 2\% \times 1 \text{ year}$ ). Assuming he lives 15 years past retirement, the present value of the payments on the retirement date (2032) is \$21,940.55 (PV of 15 year annuity of \$2,563.30 at 8%). At the end of his first year of employment (2008), the present value of the annuity that begins in 24 years is \$3,460.01 (\$21,940.55 discounted at 8% for 24 years).

Therefore, the PBO at the end of 2008 (McElwain's first year of employment) is \$3,460.01. A table outlining these cash flows is shown in Figure 1.



Figure 1: Calculation of the PBO at the End of 2008

<i>Year</i>	<i>Years of Service</i>	<i>Projected Salary</i>	<i>Years in Retirement</i>	<i>Benefit Payment (end of year)</i>	<i>Present Value (end of year)</i>
2008	1	\$50,000.00			<b>PBO = \$3,460.01</b>
2009	2	\$52,000.00			
2010	3	\$54,080.00			
2030	23	\$118,495.94			
2031	24	\$123,235.78			
2032	25	\$128,165.21			\$21,940.55
2033			1	\$2,563.30	
2034			2	\$2,563.30	
2035			3	\$2,563.30	
2046			14	\$2,563.30	
2047			15	\$2,563.30	

After two years of employment, McElwain's benefit is \$5,126.61 ( $\$128,165.21 \times 2\% \times 2$  years). The present value of the payments on the retirement date (2032) is \$43,881.09 (PV of 15 year annuity of \$5,126.61 at 8%). At the end of his second year of employment (2009), the present value of the annuity that begins in 23 years is \$7,473.62 (\$43,881.09 discounted at 8% for 23 years).

Therefore, the PBO at the end of 2009 (McElwain's second year of employment) is \$7,473.62. A table outlining these cash flows is shown in Figure 2.

Figure 2: Calculation of the PBO at the End of 2009

<i>Year</i>	<i>Years of Service</i>	<i>Projected Salary</i>	<i>Years in Retirement</i>	<i>Benefit Payment (end of year)</i>	<i>Present Value (end of year)</i>
2008	1	\$50,000.00			
2009	2	\$52,000.00			PBO = \$7,473.62
2010	3	\$54,080.00			
2030	23	\$118,495.94			
2031	24	\$123,235.78			
2032	25	\$128,165.21			\$43,881.09
2033			1	\$5,126.61	
2034			2	\$5,126.61	
2035			3	\$5,126.61	
2046			14	\$5,126.61	
2047			15	\$5,126.61	

During 2009, the PBO increased \$4,013.61. The increase is a result of current service cost and interest cost as follows:

2008 PBO	\$3,460.01
+ Current service cost	3,736.81 (PV of 15 payments of \$2,563.30 beginning in 23 years)
+ Interest cost	<u>276.80</u> (\$3,460.01 × 8%)
2009 PBO	\$7,473.62

The current service cost is the present value of the benefits earned during 2009 and the interest cost is the increase in the PBO due to the passage of time.

Under IFRS, there is only one measure of the pension obligation. Although IFRS pension accounting terminology differs somewhat, the obligation is similar to the PBO.

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#### LOS 24.c: Describe the components of a company's defined benefit pension expense.

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Not all of the components of the PBO are immediately recognized in the income statement. Some of the components are deferred and amortized using various smoothing techniques. Smoothing reduces the volatility of pension expense and net income.

Let's look at the components of pension expense. We have already discussed current service cost and interest cost, but it won't hurt to review them again.

**Current service cost.** As previously discussed, current service cost is the present value of benefits earned by the employees during the current period. Current service cost is the increase in the PBO that is the result of the employees working one more period. Current service cost is immediately recognized as a component of pension expense.

**Interest cost.** Interest cost is the increase in the PBO due to the passage of time. It is calculated by multiplying the PBO at the beginning of the period by the discount rate. Interest cost is immediately recognized as a component of pension expense.

**Expected return on plan assets.** The employer contributes assets to a separate entity (trust) to be used to satisfy the pension obligation in the future. The return on the plan assets has no effect on the PBO. However, the expected return from the assets reduces pension expense. The difference in the expected return and the actual return is reported as a part of other comprehensive income (shareholders' equity), thereby deferring expense recognition.

**Amortization of deferred gains and losses.** An increase or decrease in the PBO that is the result of changing actuarial assumptions is reported as a component of other comprehensive income (shareholders' equity), thereby deferring expense recognition.

The changes in actuarial assumptions are accumulated with the deferred gains and losses that result from the differences in the expected return and the actual return on assets. Once the accumulated deferred gains and losses exceed 10% of the greater of PBO or plan assets, amortization is required. This arbitrary 10% "corridor" represents a materiality threshold whereby gains and losses should offset over time. The excess amount over the "corridor" is amortized as a component of pension expense over the remaining service life of the employees. The amortization of a deferred gain reduces pension expense and the amortization of a deferred loss increases pension expense.

**Amortization of past (prior) service cost.** When a firm adopts or amends its pension plan, the PBO is immediately increased. However, instead of expensing the cost immediately, it is reported as a part of other comprehensive income and amortized over the remaining service life of the affected employees.

Let's illustrate by returning to our earlier example. Assume that Transfer Trucking has decided to retroactively increase McElwain's pension benefit from 2% for each year worked to 3%. Amending the plan results in an immediate increase in the PBO. However, Transfer Trucking can amortize the additional benefits over McElwain's remaining service life (time left before retirement) as a part of pension expense.

Under IFRS, the past service cost for benefits that are fully vested are recognized in pension expense immediately; the unvested portion is amortized as a part of pension expense.

The amortization of deferred gains and losses and the amortization of past (prior) service cost reduces the volatility of pension expense. Thus, the amortization process results in pension expense that is "smoothed."

In summary, reported pension expense, sometimes referred to as net periodic benefit cost, is equal to:

$$\begin{aligned}
 &\text{Current service cost} \\
 &+ \text{Interest cost} \\
 &- \text{Expected return on assets} \\
 &\pm \text{Amortization of deferred (gains) and losses} \\
 &+ \text{Amortization of past service cost} \\
 \hline
 &= \text{Net pension expense}
 \end{aligned}$$

---

**LOS 24.d: Explain the impact of a defined benefit plan's assumptions on the defined benefit obligation and periodic expense.**

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The firm discloses three assumptions used in its pension calculations: the discount rate, the rate of compensation growth, and the expected return on plan assets.

The **discount (settlement) rate** is the interest rate used to compute the present value of the benefit obligation and the current service cost component of pension expense. The discount rate is not the risk-free rate. Rather, it is based on interest rates of high quality fixed income investments with a maturity profile similar to the future obligation. The discount rate assumption affects all three measures of the benefit obligation (PBO, ABO, and VBO) as well as pension expense.

The **rate of compensation growth** is the average annual rate by which employee compensation is expected to increase over time. The rate of compensation growth affects both the PBO and pension expense. The rate of compensation growth has no effect on the ABO or VBO since both of these measures are based on current salaries.

The **expected return on plan assets** is the assumed long-term rate of return on the plan investments. Recall that the expected return reduces pension expense and the differences in the expected return and actual return are deferred.

Firms can improve reported results by *increasing* the discount rate, *reducing* the compensation growth rate, and/or *increasing* the expected return on plan assets.

*Increasing* the discount rate will:

- Reduce present values; hence, all three measures of the pension obligation are lower. A lower PBO improves the funded status of the plan.
- Usually result in lower pension expense because of lower current service cost. Recall that current service cost is a present value calculation; thus, an increase in the discount rate reduces the present value of a future sum.
- Usually reduce interest cost ( $\text{PBO} \times \text{the discount rate}$ ) unless the plan is mature.



*Professor's Note: There are two offsetting effects. A higher discount rate will decrease the PBO, but the product of the lower PBO and the higher discount rate will usually result in lower interest cost. In mature plans where interest cost is high relative to service cost, interest cost may actually increase because the PBO declines only slightly. This occurs because the product of the slightly lower PBO and the higher discount rate now result in a higher interest cost. In fact, the increase in the interest cost may be large enough, in rare cases, to completely offset the lower current service cost and actually increase pension expense.*

Decreasing the compensation growth rate will:

- Reduce future pension payments; hence, PBO is lower. A lower PBO improves the funded status of the plan. Since ABO and VBO are based on current salary levels, the compensation growth rate only affects PBO.
- Reduce current service cost and lower interest cost; thus, pension expense will decrease.

Increasing the expected return on plan assets will:

- Reduce pension expense.
- Not affect the benefit obligation or the funded status of the plan.

Figure 3 summarizes the effects of changes in these assumptions on the PBO, the ABO, and the VBO.

**Figure 3: Effect of Changing Pension Assumptions on Benefit Obligations**

<i>Effect on...</i>	<i>Increase Discount Rate</i>	<i>Decrease Rate of Compensation Growth</i>	<i>Increase Expected Rate of Return</i>
PBO	Decrease	Decrease	No effect
ABO	Decrease	No effect	No effect
VBO	Decrease	No effect	No effect

Figure 4 summarizes the effect of changes in these assumptions on pension expense.

**Figure 4: Effect of Changing Pension Assumptions on Pension Expense**

<i>Effect on...</i>	<i>Increase Discount Rate</i>	<i>Decrease Rate of Compensation Growth</i>	<i>Increase Expected Rate of Return</i>
Current service cost	Decrease	Decrease	No effect
Interest cost	Decrease*	Decrease	No effect
Expected return	No effect	No effect	Increase
Pension expense	Decrease*	Decrease	Decrease

\* For mature plans, a higher discount rate might increase interest costs. In rare cases, interest cost will increase by enough to offset the decrease in the current service cost, and pension expense will increase.

The assumptions are similar for other post-employment benefits except the compensation growth rate is replaced by a healthcare inflation rate. Generally, the presumption is the inflation rate will taper off and eventually become constant. This constant rate is known as the **ultimate healthcare trend rate**.

All else equal, firms can reduce the post-employment benefit obligation and periodic expense by lowering the near term healthcare inflation rate, by lowering the ultimate healthcare trend rate, or by reducing the time needed to reach the ultimate healthcare trend rate.

Also, since most post-employment healthcare plans are unfunded, there may not be an expected rate of return assumption.

Analysts must compare the pension and other post-employment benefit assumptions over time and across firms to assess the quality of earnings. Earnings quality deals with the conservatism of management's financial reporting assumptions.

In addition, analysts should consider whether the assumptions are internally consistent. For example, the discount rate and compensation growth rate should reflect a consistent view of inflation. If the assumptions are inconsistent, the firm may be manipulating the financial statements by using aggressive assumptions.

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**LOS 24.e: Explain the impact on financial statements of International Financial Reporting Standards (IFRS) and U.S. Generally Accepted Accounting Principles (U.S. GAAP) for pension and other post-employment benefits that permit items to be reported in the footnotes rather than in the financial statements.**

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Neither the PBO nor the plan assets are separately reported on the balance sheet. Instead, firms following U.S. GAAP report the funded status on the balance sheet in accordance with a relatively new standard, SFAS No. 158, *Employers' Accounting for Defined Benefit Pensions and Other Postretirement Plans*. The funded status is the difference between the PBO and the plan assets. If the PBO exceeds the plan assets, the difference is reported as a liability. If the plan assets exceed the PBO, the difference is reported as an asset.

Firms following IFRS also report the funded status, but only after eliminating any past service cost and deferred gains and losses that have not yet been recognized in the income statement. In this case, the firm must provide a reconciliation of the funded status and the net pension asset or liability that appears on the balance sheet. We discuss this reconciliation in more detail later in this review.

Even though the PBO and plan assets are not separately reported on the balance sheet, firms are required to disclose a reconciliation of each in the financial footnotes. Recall the PBO reconciliation from our earlier discussion:

$$\begin{aligned}
 & \text{PBO at beginning of period} \\
 & + \text{Current service cost} \\
 & + \text{Interest cost} \\
 & + \text{Plan amendments} \\
 & \pm \text{Actuarial (gains) and losses} \\
 & \underline{- \text{Benefits paid}} \\
 & = \text{PBO at end of period}
 \end{aligned}$$

The plan assets consist of a portfolio of investments managed to generate the income and principal growth necessary to pay the pension benefits as they come due. The plan assets are increased by the actual return on the assets and by the employer's contributions. The plan assets are decreased by benefits paid to the beneficiaries. A reconciliation of plan assets is disclosed in the footnotes as follows:

$$\begin{aligned}
 & \text{Fair value of plan assets at beginning of period} \\
 & + \text{Actual return on assets} \\
 & + \text{Employer contributions} \\
 & \underline{- \text{Benefits paid}} \\
 & = \text{Fair value of plan assets at end of period}
 \end{aligned}$$

Changes in the PBO and plan assets immediately affect the funded status (difference in PBO and plan assets). However, as previously discussed, not all of the changes are immediately recognized as pension expense in the income statement. Changes in actuarial assumptions, past service cost, and the difference between the expected rate of return and the actual rate of return are recognized in the income statement over time, thereby smoothing pension expense.

## Pension Accounting Under IFRS

Under IFRS, smoothing also affects the net pension asset or liability reported on the balance sheet. Recall the funded status is the true economic position of the plan (difference in the PBO and the plan assets). The funded status can fluctuate because of changes in actuarial assumptions, plan amendments, and market volatility of the plan assets.

Pension accounting under IFRS reduces the volatility of the funded status by eliminating the amounts that have not yet been recognized in the income statement. The following reconciliation of the funded status and the net pension asset or liability is a required disclosure in the footnotes.

$$\begin{aligned}
 & \text{Funded status (fair value of plan assets – PBO)} \\
 & \pm \text{Unrecognized deferred (gains) and losses} \\
 & + \text{Unrecognized past service cost} \\
 & \pm \text{Unrecognized transition (asset) or liability} \\
 & \underline{\hspace{10em}} \\
 & = \text{Net pension asset (liability) reported on the balance sheet}
 \end{aligned}$$

The transition asset or liability is an amount that was created when the pension was adopted. This is not a very important component of the net pension asset or liability any longer because it has been almost completely amortized by most firms.



*Professor's Note: You are probably asking yourself, "Why do we add back losses and subtract gains in arriving at the net pension asset or liability?" Here's a simple example. Suppose that the fair value of the plan assets is \$100, the PBO is \$110, and there are no unrecognized deferrals. In this case, the funded status and the net pension liability are both (\$10). Now, suppose that there is a loss of \$5 because the forecasted life expectancy of the employees is increased (which is a change in an actuarial assumption). The fair value of the plan assets is still \$100, but the PBO increases to \$115 because of the higher future obligation. The funded status is now (\$15); however, since the loss has not yet been recognized in the income statement, the net pension liability remains (\$10) [(\$15) funded status + \$5 unrecognized loss].*

### Pension Accounting Under U.S. GAAP

U.S. pension accounting standards changed in December 2006. According to SFAS 158, the funded status (difference between the PBO and the plan assets) is now reported on the balance sheet.



*Professor's Note: This is where current U.S. GAAP and IFRS differ. Under IFRS, the net pension asset or liability reported on the balance sheet represents the funded status adjusted for unrecognized items. Under current U.S. GAAP, the net pension asset or liability is equal to the funded status, without adjustment for unrecognized items.*

Prior to SFAS 158 (and under current IFRS), firms were required to provide a reconciliation of the funded status and the reported net pension asset or liability. The reconciliation can be used to make an adjustment to the new standard for comparison purposes.

For example, at the end of 2005, Payroll Professionals provided the following information in the footnotes to its financial statements:

Reconciliation of Funded Status to Pension Liability	
Fair value of plan assets	\$1,100
PBO	(2,250)
<b>Funded status</b>	<b>(\$1,150)</b>
Unrecognized prior service cost	920
Unrecognized actuarial losses	160
<b>Net pension asset (liability) on balance sheet</b>	<b>(\$70)</b>



SFAS 158 was not in effect in 2005. Thus, Payroll Professionals would have reported a net pension liability of only \$70. However, had the new standard been in effect, the firm would have reported a net pension liability of \$1,150. Thus, for comparison purposes, it is necessary to increase liabilities \$1,080 ( $\$1,150 - \$70$ ) and decrease shareholders' equity (other comprehensive income). In this case, applying the new standard significantly increases leverage.



*Professor's Note: The adjustment would be the same if Payroll Professionals reported under IFRS. In either case, this is an easy adjustment. Remember, the accounting equation must always balance. So, if we increase liabilities (or decrease assets), equity must decrease. Conversely, if we decrease liabilities (or increase assets), equity must increase.*

SFAS 158 only affects the net pension asset or liability reported on the balance sheet. The calculation of pension expense is not affected by the new standard. Pension expense still includes the smoothing effects of the amortization of deferred gains and losses and the amortization of past service cost.

SFAS 158 also applies to other post-employment benefit plans. To summarize, the net pension asset or liability reported on the balance sheet now represents economic reality under U.S. GAAP. Reported pension expense, however, is still a smoothed number that may not represent economic reality and, thus, will require adjustment for analytical purposes.

The IASB is expected to issue a new pension standard in the near future that is similar to SFAS 158.

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### LOS 24.h: Calculate the underlying economic pension expense (income) and other post-employment expense (income) based on disclosures.

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*Professor's Note: We present this LOS out of order.*

As previously discussed, reported pension expense is a smoothed number. It includes the expected return on assets, the amortization of deferred gains and losses, and the amortization of plan amendments.

Analysts often calculate **economic pension expense** by eliminating the smoothing amounts and including the *actual* return on assets. The result is a more volatile measure of pension expense.

Economic pension expense can be calculated by summing all of the changes in PBO for the period (except for benefits paid) and then subtracting the actual return on assets. Alternatively, economic pension expense is equal to the change in the funded status for the period excluding the firm's contributions.

Consider the following example.

**Example: Calculating economic pension expense**

Payroll Professionals reported the following information in the footnotes to its financial statements:

<i>Reconciliation of Beginning and Ending PBO</i>	
Beginning PBO	\$1,250
+ Current service cost	580
+ Interest cost	70
+ Plan amendments	440
– Benefits paid	<u>(90)</u>
= Ending PBO	\$2,250
<i>Reconciliation of Plan Assets</i>	
Beginning fair value of plan assets	\$1,000
+ Actual return on plan assets	150
+ Employer contributions	340
– Benefits paid	<u>(90)</u>
= Ending fair value of plan assets	\$1,400
<i>Pension Expense</i>	
Current service cost	\$580
+ Interest cost	70
– Expected return on plan assets	(80)
+ Amortization of actuarial loss	30
+ Amortization of prior service cost	<u>10</u>
= Net periodic benefit expense	\$610

Calculate economic pension expense and compare to reported pension expense.

**Answer:**

Economic pension expense is \$940 (\$580 service cost + \$70 interest cost + \$440 plan amendment – \$150 actual return on plan assets). Alternatively, economic pension expense is equal to the change in the funded status excluding the firm's contributions as follows:

Ending funded status	(850) [\$1,400 ending plan assets – \$2,250 ending PBO]
Beginning funded status	– <u>(\$250)</u> [\$1,000 beginning assets – \$1,250 beginning PBO]
Change in funded status	(\$600)
Remove contributions	– <u>340</u>
Economic pension expense	(\$940)

The economic pension expense of \$940 is higher than the reported pension expense of \$610. Reported pension expense does not immediately reflect all of the changes in the PBO; rather, the changes are amortized over time, thereby resulting in smoother pension expense.

Reported pension expense is usually deducted as an operating expense in the income statement. For analytical purposes, only the current service cost component should be included as an operating expense. Interest cost and the actual return on plan assets should be included as nonoperating items in the income statement. Accordingly, interest cost should be added to the firm's interest expense, and the actual return on plan assets should be added to nonoperating income.

### Example: Reclassifying pension expense for analytical purposes

Use the following information to reclassify the components of pension expense between operating and nonoperating items:

#### Partial Income Statement

Operating profit	\$145,000
Interest expense	(12,000)
Other income	<u>2,000</u>
Income before tax	\$135,000

#### Other data

Current service cost	\$7,000
Interest cost	5,000
Expected return on assets	8,000
Actual return on assets	9,500

#### Answer:

Reported pension expense of \$4,000 (\$7,000 current service cost + \$5,000 interest cost – \$8,000 expected return on assets) is added back to operating profit. Then, service cost of \$7,000 is subtracted from operating profit, interest cost of \$5,000 is added to interest expense, and the actual return on assets of \$9,500 is added to other income. Following is the adjusted partial income statement:

Partial Income Statement	<i>Reported</i>	<i>Adjustments</i>	<i>Adjusted</i>
Operating profit	\$145,000	+4,000 – 7,000	\$142,000
Interest expense	(12,000)	– 5,000	(17,000)
Other income	<u>2,000</u>	+9,500	<u>11,500</u>
Income before tax	\$135,000		\$136,500

Similarly, analysts can calculate the economic post-employment benefit expense. The economic expense should also be reclassified into its operating and nonoperating components for analytical purposes.

### LOS 24.f: Evaluate pension plan footnote disclosures including cash flow related information.

Rarely does the reported pension expense equal the cash flows required by the pension plan or other post-employment benefit plan. In a funded plan, the cash flows occur when the company makes contributions to the plan. In an unfunded plan, like a post-employment healthcare plan, the cash flows occur when the benefits are paid. In either case, the cash flows are reported as operating activities in the cash flow statement.

As previously discussed, the economic pension expense represents the true cost of the pension. If the firm's contributions exceed the economic pension expense, the difference can be viewed as a reduction in the overall pension obligation, similar to an excess principal payment on a loan. Conversely, if the economic pension expense exceeds the contributions, the difference can be viewed as a source of borrowing.

If the differences in cash flow and economic pension expense are material, the analyst should consider reclassifying the difference from operating activities to financing activities in the cash flow statement.

Let's return to our previous example where we calculated the economic pension expense of \$940 (\$580 service cost + \$70 interest cost + \$440 plan amendment – \$150 actual return on plan assets).

The employer's contribution was only \$340. Since the economic pension expense exceeds the cash flow, the difference, net of tax, is treated as a borrowing in the cash flow statement for analytical purposes. Assuming a tax rate of 40%, \$360 is reclassified from operating cash flow to financing cash flow  $[(\$940 \text{ economic pension expense} - \$340 \text{ employer contribution}) \times (1 - 40\% \text{ tax rate})]$ .

### LOS 24.g: Evaluate the underlying economic liability (or asset) of a company's pension and other post-employment benefits.

As previously discussed, firms do not report the plan assets and PBO separately on the balance sheet. Rather the net pension asset or liability is reported. Under current U.S. GAAP, the net pension asset or liability is the funded status; that is, the difference in the PBO and the plan assets. If the plan assets exceed the PBO, the plan is overfunded, and a net asset is reported. Conversely, if the PBO exceeds the plan assets, the plan is underfunded, and a net liability is reported. Firms following IFRS also report the funded status but only after eliminating any past service cost and deferred gains and losses that have not yet been recognized in the income statement.

There are two reasons for netting pension assets and liabilities:

1. The employer largely controls the plan assets and the obligation and, therefore, bears the risks and potential rewards.
2. The company's decisions regarding funding and accounting for the pension plan are more likely to be affected by the net pension obligation, not the gross amounts, because the plan assets can only be used for paying pension benefits to its employees.

This unique netting procedure affects certain ratios because the firm's total assets and total liabilities are lower than if the firm reported the gross amounts. For example, return on assets (ROA) would likely be lower if the gross amounts were reported on the balance sheet (higher denominator). In addition, leverage ratios will likely be higher with the gross amounts.

Since the pension assets and liabilities are netted, it is important to analyze the effect of changes in the pension assumptions. Changing an assumption may have a small effect on the PBO, but may have a much larger effect on the net pension amount.

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**LOS 24.i: Discuss the issues involved in accounting for share-based compensation.**

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Share-based compensation can take one of several forms, including stock options and outright share grants. They have the advantages of serving to motivate and retain employees as well as being a way to reward employees in a way that does not require an outlay of cash.

Recording the expense of cash compensation is straightforward; it is recorded as the compensation is earned. Stock options and share grants raise several issues. If the shares are not publicly traded, an estimate of value must be used for stock grants. Even when a market price for the shares is available, the value of stock options must be estimated using a model for options valuation.

Shares or options may be granted with contingencies. In these cases, the estimated expense may be spread over a period of time. For example, if shares are granted, but cannot be sold for a period of time, the expense recorded as compensation is spread over the period of time from the grant date until the date on which they can be sold by the employee. The overall principle here is that the compensation expense should be spread over the period for which they reward the employee, referred to as the service period.

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**LOS 24.j: Explain the impact on financial statements of accounting for stock grants and stock options, and the importance of companies' assumptions in valuing these grants and options.**

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Accounting for share-based compensation is similar under IFRS and U.S. GAAP.

**Stock options.** Until recently, compensation expense for stock options was typically based on the intrinsic value method. Using the intrinsic value method, compensation expense was recognized in the income statement only if the market price of the stock exceeded the exercise price of the option on the date the option was granted (grant date). Since most options are out-of-the-money (no intrinsic value) on the grant date, no compensation expense is ever recognized under the intrinsic value method.

Now, compensation expense is based on the fair value of the option on the grant date based on the number of options that are expected to vest. The vesting date is the first date the employee can actually exercise the option. The compensation expense is

allocated in the income statement over the service period, which is the time between the grant date and the vesting date.

Let's look at an example of the fair value method.

On January 1, 2007, the shareholders of Park Glen Corporation granted 500 stock options to its CEO. The CEO can exercise the options over the next five years at a price of \$60 per share (the options vest evenly over a five year period or 20% per year). On the grant date, the price of Park Glen's stock was \$55 per share. Using an option-pricing model, Park Glen determined that the value of the options on the grant date was \$1,000. At the end of the first year, the CEO exercised 100 options when the stock price was \$67 per share.

Under the intrinsic value method, no compensation expense is recognized since the options are *out-of-the-money* on the grant date. Under the fair value method, Park Glen recognizes compensation expense of \$200 ( $\$1,000 / 5$  years) each year over the 5-year service (vesting) period. The offset to compensation expense is an increase in paid-in-capital, a stockholders' equity account.

When the CEO exercised 100 options, Park Glen's cash increased \$6,000 ( $\$60$  exercise price  $\times$  100 options). Note that compensation expense is not affected when the options are exercised. Ignoring the actual journal entries, the offset to cash is an increase in stockholders' equity.

If the CEO fails to exercise the remaining stock options before they expire, no adjustment is made to compensation expense. However, if the CEO fails to satisfy the service requirement (e.g., leaves after four years), the firm will adjust compensation expense in the current period as a change in accounting estimate.

## Determining Fair Value

The fair value of the option is based on the observable market price of a similar option if one is available. Absent a market-based instrument, the firm can use an option-pricing model such as Black-Scholes or the binomial model. There is no preference of a specific model in either IFRS or U.S. GAAP.



*Professor's Note: Since market options differ from the custom terms of employee options, usually, a comparable market option is not available. Also, see Study Session 17 for a complete discussion of option-pricing models.*

Option-pricing models typically incorporate the following six inputs:

1. Exercise price.
2. Stock price at the grant date.
3. Expected term.
4. Expected volatility.
5. Expected dividends.
6. Risk-free rate.

Many of the inputs require subjective estimates that can significantly affect the fair value of the option and, ultimately, compensation expense. For example, lower volatility, a shorter term, and a lower risk-free rate will usually decrease the estimated fair value and, thus, lower compensation expense. A higher expected dividend yield will also decrease the estimated fair value.

**Stock grants.** Compensation expense for stock granted to an employee is based on the fair value of the stock on the grant date. The compensation expense is allocated over the employee's service period.

A stock grant can involve an outright transfer of stock without conditions, restricted stock, and performance stock. With restricted stock, the transferred stock cannot be sold by the employee until vesting has occurred. Performance stock is contingent on meeting performance goals, such as accounting earnings or other financial reporting metrics like return on assets or return on equity. Unfortunately, tying performance to accounting earnings and other metrics may result in manipulation by the employee.

**Stock appreciation rights.** The difference in a stock appreciation right and an option is the form of payment. A stock appreciation award gives the employee the right to receive compensation based on the increase in the price of the firm's stock over a predetermined amount. The firm might pay the appreciation in cash, equity, or a combination of both. With stock appreciation rights, the employees have limited downside risk and unlimited upside potential, thereby limiting the risk aversion problem discussed earlier. Also, since no shares are actually issued, there is no dilution to the existing shareholders.

**Phantom stock.** Phantom stock is similar to stock appreciation rights except the payoff is based on the performance of hypothetical stock instead of the firm's actual shares. Phantom stock can be used in privately held firms and highly illiquid firms.

## KEY CONCEPTS

### LOS 24.a

In a defined-contribution plan, the firm contributes a certain sum each period to the employee's retirement account. The firm makes no promise regarding the future value of the plan assets; thus, the employee assumes all of the investment risk. Accounting is straight-forward; pension expense is equal to the firm's contribution.

In a defined-benefit plan, the firm promises to make periodic payments to the employee after retirement. The benefit is usually based on the employee's years of service and the employee's salary at, or near, retirement. Since the employee's future benefit is defined, the employer assumes the investment risk. Accounting is complicated because many assumptions are involved.

### LOS 24.b

The projected benefit obligation (PBO) is the actuarial present value of future pension benefits earned to date, based on expected future salary increases.

The accumulated benefit obligation (ABO) is the actuarial present value of future pension benefits earned to date based on current salary levels, ignoring future salary increases.

The vested benefit obligation (VBO) is the amount of the ABO that is not contingent on future service.

### LOS 24.c

Reported pension expense is a smoothed number consisting of:

- Current service cost—the present value of benefits earned by the employees during the current period.
- Interest cost—the increase in the PBO due to the passage of time.
- Expected return on plan assets—reduces pension expense.
- Amortization of deferred gains and losses—allocation based on changes in actuarial assumptions and differences in the expected return and actual return on plan assets.
- Amortization of past (prior) service cost—allocation of a plan amendment that provided retroactive benefits.

### LOS 24.d

Firms can improve reported results by increasing the discount rate, lowering the compensation growth rate, or increasing the expected return on plan assets.

### LOS 24.e

Firms are required to disclose a reconciliation of both the PBO and the plan assets. The reconciliations provide more detail and are useful for making adjustments for analytical purposes. Firms that follow IFRS are also required to provide a reconciliation of the funded status and the net pension asset or liability reported on the balance sheet.



**LOS 24.f**

If the firm's contributions exceed the economic pension expense, the difference can be viewed as a reduction in the overall pension obligation, similar to an excess principal payment on a loan. Conversely, if the economic pension expense exceeds the firm's contributions, the difference can be viewed as a source of borrowing.

If the differences in cash flow and economic pension expense are material, the analyst should consider reclassifying the difference from operating activities to financing activities in the cash flow statement.

**LOS 24.g**

Firms do not report the plan assets and PBO separately on the balance sheet. Rather, the net pension asset or liability is reported. Under U.S. GAAP, the net asset or liability is the funded status (difference in plan assets and PBO). The funded status represents the economic reality of the plan. Under IFRS, the net pension asset or liability is equal to the funded status after eliminating the unrecognized past service cost and unrecognized deferred gains and losses.

**LOS 24.h**

Analysts often calculate economic pension expense by eliminating the smoothing amounts and including the actual return on assets. Economic pension expense can be calculated by summing all of the changes in PBO for the period (except for benefits paid) and then subtracting the actual return on assets. Alternatively, economic pension expense is equal to the change in the funded status for the period excluding the firm's contributions.

For analytical purposes, service cost should be reported as an operating expense. Interest cost and the actual return on plan assets should be reported as nonoperating items.

**LOS 24.i**

Share-based compensation raises issues about the valuation of the specific compensation as well as about the period in which, or periods over which, the compensation expense should be recorded.

**LOS 24.j**

Share-based compensation expense is based on the fair value at the grant date. To determine fair value, it is often necessary to use imperfect pricing models.

Many of the pricing model inputs require subjective estimates that can significantly affect the fair value of the option and, ultimately, compensation expense. For example, lower volatility, a shorter term, and a lower risk-free rate will usually decrease the estimated fair value. A higher expected dividend yield will also decrease the estimated fair value.

## CONCEPT CHECKERS

1. Which of the following statements about retirement plans is *most accurate*?
  - A. The amount recorded on the balance sheet for a defined-benefit plan under IFRS is the plan's funded status.
  - B. In a defined-contribution plan, pension expense is calculated as the difference in the contribution amount and the actual return on plan assets.
  - C. In a defined-benefit plan, the employer assumes the majority of the investment risk.
2. Which of the following components of the projected benefit obligation is *most likely* to increase every year as a direct result of the employee working another year for the company?
  - A. Current service cost.
  - B. Interest cost.
  - C. Benefits paid.

Use the following information to answer Questions 3 through 6.

The financial statements of Tanner, Inc., for the year ended December 31, 2009, include the following (in \$ millions):

PBO at January 1, 2009	\$435
Current service cost	63
Interest cost	29
Benefits paid	<u>– 44</u>
PBO at December 31, 2009	\$483
Fair value of plan assets at January 1, 2009	\$522
Actual return on plan assets	77
Employer contributions	48
Benefits paid	<u>– 44</u>
Fair value of plan assets at December 31, 2009	\$603
Average remaining years of service for employees	10
Expected return on plan assets: 12 months ended 12/31/09	\$32

3. Assuming there were no deferred or unamortized amounts as of January 1, 2009, Tanner's reported pension expense (in millions) for the year ended December 31, 2009, is *closest* to:
  - A. \$15.
  - B. \$60.
  - C. \$92.
4. The funded status of the Tanner pension plan (in millions) as of December 31, 2009, is *closest* to:
  - A. underfunded by \$212.
  - B. underfunded by \$120.
  - C. overfunded by \$120.

5. Tanner's economic pension expense (in millions) for the year ended 2009 is *closest* to:
- A. \$0.
  - B. \$15.
  - C. \$41.
6. For analytical purposes, what adjustment to the cash flow statement would *best* reflect the substance of Tanner's pension contributions?
- A. Increase operating cash flow and decrease financing cash flow.
  - B. Decrease operating cash flow and increase financing cash flow.
  - C. No adjustment is necessary for analytical purposes.
7. Suppose management changes its assumption related to mortality rates of its employees, which results in an increase in the projected benefit obligation (PBO). The increase in the PBO is *most likely* to be reported as:
- A. an increase in prior service cost.
  - B. an actuarial loss.
  - C. an actuarial gain.
8. The funded status of NICEE Company's pension plan on December 31, 2007, is \$85 million underfunded. Unrecognized actuarial gains total \$12 million and unrecognized prior service cost is \$27 million. What is the amount of the net pension liability reported on NICEE's balance sheet on December 31, 2007, according to IFRS?
- A. \$70 million.
  - B. \$85 million.
  - C. \$100 million.
9. Best Taste Marketing follows IFRS and reports a \$33 million net pension liability in its balance sheet at the end of 2009. In the footnotes to the financial statements, the company discloses a projected benefit obligation (PBO) of \$106 million and a fair value of pension plan assets of \$81 million. Assume the marginal tax rate is zero. Which of the following is the *most appropriate* adjustment in order to compare Best Taste Marketing to a U.S. firm?
- A. Decrease liabilities by \$8 million and increase equity by \$8 million.
  - B. Decrease liabilities by \$30 million and increase equity by \$30 million.
  - C. Increase assets by \$3 million and increase liabilities by \$3 million.
10. Which of the following statements *best* describes the impact of an increase in the discount rate on PBO and pension expense of a defined-benefit retirement plan covering a relatively young workforce?
- A. Decrease the PBO and increase pension expense.
  - B. Decrease the PBO and decrease pension expense.
  - C. Increase the PBO and decrease pension expense.
11. All else equal, which of the following statements *best* describes the impact of an increase in the expected return on plan assets?
- A. Increase in plan assets and decrease in pension expense.
  - B. Decrease in PBO and increase in service cost.
  - C. Increase in net income.

Use the following information to answer Questions 12 and 13.

You have just been hired as the controller at Vincent, Inc. Vincent has a defined-benefit retirement plan for its employees. The firm has a relatively young workforce with a low percentage of retirees. Your first task is to analyze the effects of changing assumptions on different variables used to calculate certain pension amounts.

12. Which of the following *best* describes the impact of an increase in the compensation growth rate?
  - A. Retained earnings are lower.
  - B. Both the PBO and the ABO are higher.
  - C. The plan assets are higher.
13. All else equal, a decrease in the discount rate will *most likely* have what impact on the funded status?
  - A. Increase.
  - B. Decrease.
  - C. No effect.
14. Which of the following are necessary inputs in order to compute share-based compensation expense using an option pricing model?
  - A. The exercise price and the stock price one year after the grant date.
  - B. The expected dividend yield and the firm's cost of capital.
  - C. The expected term of the option and the expected volatility of the stock price.
15. Which of the following statements about share-based compensation is *most accurate*?
  - A. Compensation expense is only recognized if an employee stock option has intrinsic value on the grant date.
  - B. In a restricted stock plan, the employer recognizes compensation expense when the employee sells the stock.
  - C. The compensation expense for employee stock options is allocated over the employee's service period.
16. Company Z has a defined-benefit plan. The projected benefit obligation is \$60 million, the accumulated benefit obligation is \$50 million, and the vested benefit obligation is \$40 million. The fair value of the plan's assets is \$40 million. According to SFAS No. 158, what amount should Company Z report on its balance sheet as a result of the pension?
  - A. \$10 million liability.
  - B. \$10 million asset.
  - C. \$20 million liability.

## CHALLENGE PROBLEMS

17. Jacklyn King has been asked to do some accounting for Alexeeff Corp.'s pension plan. At the beginning of the period, the PBO was \$12 million, and the fair market value of plan assets totaled \$8 million. The discount rate is 9%, expected return on plan assets is \$0.96 million, and the anticipated compensation growth rate is 4%. At the end of the period, it was determined that the actual return on assets was 14%, plan assets equaled \$9 million, and the service cost for the year was \$0.9 million. Ignore amortization of unrecognized prior service costs and deferred gains and losses. Pension expense for the year is *closest* to:
- A. \$0.72 million.  
B. \$0.86 million.  
C. \$1.02 million.
18. The net amount of the cost components of Heritage Bakery's projected benefit obligation for 2007 was \$38 million. Cost components include current service cost, interest cost, actuarial gains and losses, and prior service costs. The fair market value of plan assets on January 1, 2007, was \$159 million. The projected benefit obligation (PBO) on January 1, 2007, was \$193 million, and the PBO on December 31, 2007, was \$220 million. There are no effects of foreign currency exchange rate changes, business combinations, divestitures, curtailments, settlements, special terminations, or contributions by the employer or plan participants. Actual return on assets in 2007 was \$32 million. The expected return on plan assets for 2007 was 10%. The fair value of plan assets on December 31, 2007, is *closest* to:
- A. \$148 million.  
B. \$164 million.  
C. \$180 million.
19. SCP Incorporated disclosed the following information related to its defined-benefit pension plan:

	2007	2006	2005
Discount rate	4.4%	4.3%	4.1%
Expected return on assets	5.2%	4.9%	4.9%
Expected salary growth rate	3.1%	3.1%	3.1%
Actual inflation rate	2.3%	2.5%	2.6%
	2007	2006	2005
Allocation of plan assets:			
Debt investments	40.0%	30.0%	30.0%
Equity investments	60.0%	70.0%	70.0%

SCP's pension assumptions are internally consistent with regard to:

- A. inflation expectations but not asset returns.  
B. asset returns but not inflation expectations.  
C. neither asset returns nor inflation expectations.

## ANSWERS – CONCEPT CHECKERS

1. C In a defined-benefit pension plan, the employer assumes the investment risk. The net pension asset or liability reported under IFRS is the funded status after eliminating the unrecognized deferred gains and losses and the unrecognized past service cost. In a defined-contribution plan, pension expense is equal to the employer's contribution to the plan.
2. A The current service cost is the present value of new benefits earned by the employee working another year. Current service cost increases the PBO. Note that the interest cost increases every year regardless of whether the employee works another year or not.
3. B Where there are no amortizations, pension expense is equal to service cost + interest cost – the expected return on assets ( $\$63 + \$29 - \$32 = \$60$ ).
4. C A plan is overfunded when the fair value of plan assets exceeds the PBO. The Tanner plan is \$120 overfunded ( $\$603 - \$483$ ).
5. B Economic pension expense = current service cost + interest cost – actual investment return ( $\$63 + \$29 - \$77 = \$15$ ). No figures for actuarial losses and plan amendments were given, so we assume they are zero.
6. A Tanner's contributions of \$48 exceeded the economic pension expense of \$15. Thus, the difference of \$33 should be treated similar to an excess principal payment on a loan. Principal payments are reported as financing activities in the cash flow statement. The adjustment calls for increasing operating cash flow and decreasing financing cash flow by \$33.
7. B An actuarial loss resulting from changes in actuarial assumptions (such as mortality rates) leads to an increase in the PBO. Prior service cost increases the PBO as a result of amendments to the pension plan.
8. A Under IFRS, the net pension liability is equal to the funded status after eliminating the unrecognized deferred gains and losses and past service cost. The net pension liability is (\$70) [ $(\$85)$  funded status – \$12 unrecognized actuarial gain + \$27 unrecognized past service cost]. A negative answer indicates a net pension liability.
9. A The funded status of the plan is the difference in the PBO (\$106 million) and the fair value of plan assets (\$81 million), which is a liability of \$25 million. The actual pension liability on the balance sheet is \$33 million. Therefore, the pension liability should be decreased by \$8 million to \$25 million with an offsetting increase in equity.
10. B The use of a higher discount rate will result in lower present values and, hence, lower current service cost. Lower service cost will result in a lower PBO and lower pension expense.
11. C The expected return on assets does not affect the calculation of the PBO. Pension expense is decreased by the expected return on assets. If the expected return assumption is increased, then pension expense decreases. Lower pension expense will result in higher net income.

12. A A higher compensation growth rate will increase pension expense and, thus, lower net income. Lower net income results in lower retained earnings. A higher compensation growth rate will increase the PBO, but the ABO will not be affected. The compensation growth rate does not affect the plan assets.
13. B A decrease in the discount rate will increase the PBO. A higher PBO lowers the funded status (plan assets – PBO).
14. C The stock price after the grant date and the firm's required cost of capital are not inputs to option pricing models.
15. C For share-based compensation, expense is recognized based on the fair value of the compensation as of the grant date and allocated over the employee's service period. No expense is recognized when the option is exercised or the stock is sold.
16. C According to SFAS 158, the funded status equals plan assets minus PBO. This plan is underfunded by \$20 million (\$40 million plan assets – \$60 million PBO), which is reported as a liability on the balance sheet.

## ANSWERS – CHALLENGE PROBLEMS

17. C  $\text{pension expense} = \text{current service cost} + \text{interest cost} - \text{expected return on assets}$   
 $\text{current service cost} = \$0.90 \text{ million (given)}$   
 $\text{interest cost} = \text{PBO at the beginning of the period} \times \text{discount rate}$   
 $\quad = \$12 \text{ million} \times 0.09$   
 $\quad = \$1.08 \text{ million}$   
 $\text{expected return on plan assets} = \$0.96 \text{ million (given)}$   
 $\text{total pension expense} = \$0.90 \text{ million} + \$1.08 \text{ million} - \$0.96 \text{ million} = \$1.02 \text{ million}$
18. C The first step is to solve for benefits paid. The beginning PBO balance plus the cost components minus benefits paid is equal to the ending PBO balance:  $\$193 + \$38 - \text{benefits paid} = \$220 \text{ million}$ , which implies benefits paid are equal to \$11 million. The ending fair value of plan assets is equal to beginning value plus actual return on assets less benefits paid:  $\$159 + \$32 - \$11 = \$180 \text{ million}$ .
19. C Neither inflation expectations nor asset returns are internally consistent. The discount rate is increasing, but the inflation rate is decreasing. There is usually a direct relationship between the discount rate and the inflation rate. In 2007, the expected rate of return increased; however, SPC decreased its allocation to equity investments. Normally, reducing exposure to equity investments in favor of debt investments will decrease returns.

# MULTINATIONAL OPERATIONS

Study Session 6

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## EXAM FOCUS

This topic review covers a detailed discussion of accounting for foreign subsidiaries and operations of multinational firms. The main issue is how to convert the results of a foreign subsidiary into the parent's consolidated financial statements. You have several significant tasks to master. First, you need to become familiar with the terminology of translation. Second, you need to be able to distinguish between and implement the two methods of accounting for foreign operations (i.e., remeasurement via the temporal method or translation via the current rate method). Third, you need to be able to analyze the impact of these two methods on reported earnings, cash flows, and financial ratios for both the subsidiary and the parent. This reading is important and challenging. Begin by concentrating on the examples of each method and then move on to the analysis section.

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### LOS 25.a: Distinguish among presentation currency, functional currency, and local currency.

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Foreign currency can affect a multinational firm's financial statements in two ways: (1) the multinational firm may engage in business transactions that are denominated in a foreign currency, and (2) the multinational firm may invest in subsidiaries that maintain their books and records in a foreign currency. In both cases, special accounting treatment is required.

Before we move on, we need to define the different currencies that are involved in multinational accounting.

- The **local currency** is the currency of the country being referred to.
  - The **functional currency**, determined by management, is the currency of the primary economic environment in which the entity operates. It is usually the currency in which the entity generates and expends cash. The functional currency can be the local currency or some other currency.
  - The **presentation (reporting) currency** is the currency in which the parent company prepares its financial statements.
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### LOS 25.b: Analyze the impact of changes in exchange rates on the translated sales of the subsidiary and parent company.

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Foreign currency denominated transactions, including sales, are measured in the presentation (reporting) currency at the spot rate on the transaction date. Foreign currency risk arises when the transaction date and the payment date differ.



For example, let's assume that a U.S. firm sells goods to a company located in Italy for €10,000 when the spot exchange rate is \$1.60 per euro. Payment is due in 30 days. When payment is actually received, let's assume the euro has depreciated to \$1.50.



*Professor's Note: Direct foreign currency quotations will be used throughout this topic review. In a direct quotation, the home currency is placed in the numerator. If you are more comfortable with an indirect quotation, whereby the home currency is placed in the denominator, you are welcome to make the conversion. The indirect quotation is simply the inverse of the direct quotation. So, in our above example, a direct quotation of \$1.60 per euro would be expressed in indirect form as €0.625 per dollar.*

On the transaction date, the U.S. firm recognizes a sale, and an account receivable, in the amount of \$16,000 ( $€10,000 \times \$1.60$ ). On the payment date, the U.S. firm receives €10,000 and immediately converts the euros to \$15,000 ( $€10,000 \times \$1.50$ ). As a result of the depreciating euro, the U.S. firm recognizes a \$1,000 loss in the income statement [ $€10,000 \times (\$1.50 - \$1.60)$ ]. If the euro had appreciated to \$1.70, the U.S. firm would have recognized a \$1,000 gain [ $€10,000 \times (\$1.70 - \$1.60)$ ]. Note that the Italian firm recognized no gain or loss since the purchase and settlement transactions were both denominated in euros.

If the balance sheet date occurs before the transaction is settled, gains and losses on foreign currency transactions are recognized. Accordingly, the balance sheet amounts are adjusted based on the exchange rate on the balance sheet date, and an unrealized gain or loss is recognized in the income statement. Once the transaction is settled, additional gain or loss is recognized if the exchange rate changes after the balance sheet date.

Returning to our earlier example, let's assume the sale occurred on December 15 of last year when the euro exchange rate was \$1.60. At the end of the year, the euro depreciated to \$1.56. The transaction was settled on January 15 when the euro exchange rate was \$1.50.

At the end of the year, the U.S. firm will reduce its account receivable by \$400 and recognize a \$400 loss [ $€10,000 \times (\$1.56 - \$1.60)$ ] in the December income statement. When the receivable is collected, the U.S. firm receives €10,000 and immediately converts the euros to \$15,000 ( $€10,000 \times \$1.50$ ). As a result, a loss of \$600 [ $€10,000 \times (\$1.50 - \$1.56)$ ] is recognized in the January income statement.

If the U.S. firm purchases goods (denominated in euros) from the Italian firm with payment due in 30 days, the same concepts are applied except that the U.S. firm would recognize a gain on the payment date. In this case, the U.S. firm has an account payable denominated in euros. If the euro depreciates relative to the dollar, the U.S. firm recognizes a gain in the income statement because it will take less U.S. dollars to buy the necessary euros to settle the transaction.

**LOS 25.c: Compare and contrast the current rate method and the temporal method, analyze and evaluate the effects of each on the parent company's balance sheet and income statement, and determine which method is appropriate in various scenarios.**

There are two methods used to remeasure or translate the financial statements of a foreign subsidiary to the parent's presentation (reporting) currency.

- **Remeasurement** involves converting the local currency into functional currency using the temporal method.
- **Translation** involves converting the functional currency into the parent's presentation (reporting) currency using the current rate method. The current rate method is also known as the all-current method.



*Professor's Note: The term "translation" is used in two different ways in this topic review. First, translation refers to a specific method of converting account and transaction balances to another currency. Second, translation is used to describe the general process of converting account and transaction balances from one currency to another without identifying a specific methodology. Thus, both the remeasurement methodology and the translation methodology result in the "translation," or the conversion of account and transaction balances to another currency. The ensuing discussion should make this distinction clear.*

The translation method, current rate or temporal, is determined by the functional currency relative to the parent's presentation currency. Since the functional currency is decided by management, it may not be completely objective.

According to the IASB, management should consider the following factors in deciding on the functional currency:

- The currency that influences sales prices for goods and services.
- Currency of the country whose competitive forces and regulations mainly determine the sale price of goods and services.
- The currency that influences labor, material, and other costs.
- The currency from which funds are generated.
- The currency in which receipts from operating activities are usually retained.

The FASB provides similar guidance.

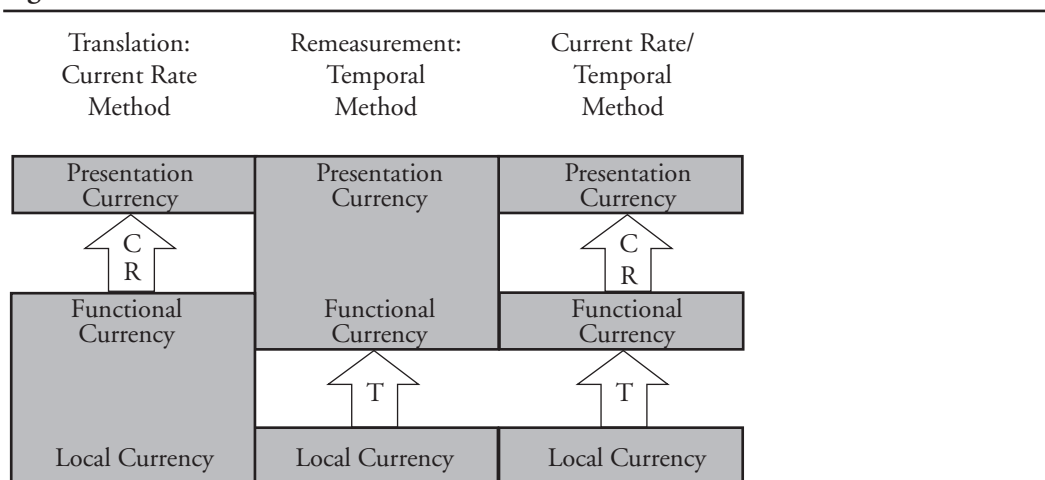
Generally, we can use the following to determine the appropriate translation method:

- If the functional currency and the parent's presentation currency differ, the *current rate method* is used to translate the foreign currency financial statements. Translation usually involves self-contained, independent subsidiaries whose operating, investing, and financing activities are decentralized from the parent. See Column 1 of Figure 1.
- If the functional currency is the same as the parent's presentation currency, the *temporal method* is used to remeasure the foreign currency financial statements. Remeasurement usually occurs when a subsidiary is *well integrated* with the parent (i.e., the parent makes the operating, investing, and financing decisions). See Column 2 of Figure 1.

- In the case where the local currency, the functional currency, and the presentation currency all differ, both the temporal method and the current rate method are used. For example, assume a U.S. firm owns a German subsidiary whose functional currency is the euro. The German subsidiary is also denominating a few transactions in Swiss francs. In this case, the temporal method is used to remeasure from the local currency (Swiss francs) into the functional currency (euros). Then, the current rate method is used to translate from the functional currency (euros) to the presentation currency (U.S. dollar). See Column 3 of Figure 1.
- If a subsidiary is operating in a hyperinflationary environment, the functional currency is considered to be the parent's presentation currency, and the temporal method is used under U.S. GAAP. Under IFRS, the subsidiary's financial statements are restated for inflation and then translated using the current rate method. Hyperinflation will be discussed in more detail later in this topic review.

Figure 1 illustrates the three ways the local currency may be remeasured and/or translated into the presentation currency of the parent. Note that the choice of the functional currency determines the method used for conversion.

**Figure 1: Three Methods for Remeasurement/Translation of Local Currencies**



Let's look at an example.

#### Example: Determining the appropriate translation method

A U.S. multinational firm has a Japanese subsidiary. The subsidiary's functional currency is the Japanese yen (¥). The subsidiary's books and records are maintained in yen. The parent's presentation currency is the U.S. dollar. Determine which foreign currency translation method is appropriate.

**Answer:**

Since the functional currency and the parent's presentation currency differ, the current rate method is used to translate the subsidiary's financial statements from yen to U.S. dollars.

Now let's assume the Japanese subsidiary's functional currency is the U.S. dollar. Since the functional currency and the parent's presentation currency are the same, the temporal method is used to remeasure the subsidiary's financial statements from yen to U.S. dollars.

Before discussing the specific procedures used in applying the current rate and the temporal methods, we need to define a few exchange rates.

- The **current rate** is the exchange rate on the balance sheet date.
- The **average rate** is the average exchange rate over the reporting period.
- The **historical rate** is the actual rate that was in effect when the original transaction occurred. For example, if a firm bought machinery on January 2, 2008, the historical rate for that transaction at every balance sheet date in the future would be the exchange rate on January 2, 2008.

### Applying the Current Rate Method

The current rate method is applied using the following procedures.

- All income statement accounts are translated at the average rate.
- All balance sheet accounts are translated at the current rate *except for common stock*, which is translated at the historical (actual) rate that applied when the stock was issued.
- Dividends are translated at the rate that applied when they were paid.
- Translation gain or loss is reported in shareholders' equity as a part of the cumulative translation adjustment (CTA).

### Applying the Temporal Method

The temporal method is applied using the following procedures:

- Monetary assets and liabilities are remeasured using the current exchange rate. Monetary assets and liabilities are fixed in the amount of currency to be received or paid and include: cash, receivables, payables, and short-term and long-term debt.
- All other assets and liabilities are considered nonmonetary and are remeasured at the historical (actual) rate. The most common nonmonetary assets include inventory, fixed assets, and intangible assets. An example of a nonmonetary liability is unearned (deferred) revenue.



*Professor's Note: There is one exception. Nonmonetary assets and liabilities measured on the balance sheet at "fair value" are remeasured at the current exchange rate, not the historical rate.*

- Just like the current rate method, common stock and dividends paid are remeasured at the historical (actual) rate.
- Expenses related to nonmonetary assets such as COGS, depreciation expense, and amortization expense are remeasured based on the historical rates prevailing at the time of purchase.
- Revenues and all other expenses are translated at the average rate.
- Remeasurement gain or loss is recognized in the income statement. This results in more volatile net income as compared to the current rate method whereby the translation gain or loss is reported in shareholders' equity.

## Inventory and COGS Under the Temporal Method

Remember, the historical rate is the actual rate in effect when the original transaction occurred. Thus, there can be numerous historical rates to keep track of as a firm purchases nonmonetary assets (e.g., inventory, fixed assets, and intangibles) over time. Inventory can be particularly complicated since the firm's cost flow assumption (e.g., FIFO, LIFO, and average cost) must also be considered.

Recall that ending inventory under FIFO consists of the costs from the most recently purchased goods. Thus, FIFO ending inventory is remeasured based on more recent exchange rates. On the other hand, LIFO COGS consists of costs that are older; thus, the exchange rates used to remeasure COGS are older.

Under LIFO, ending inventory consists of older costs; thus, the inventory is remeasured at older exchange rates. LIFO COGS, however, consists of costs from the most recently purchased goods; thus, COGS is remeasured based on more recent exchange rates.

Not surprisingly, under the weighted-average method, ending inventory and COGS are remeasured at the weighted-average exchange rate for the period.

## Exposure to Changing Exchange Rates

Before calculating the gain or loss that results from changing exchange rates, it is necessary to understand the parent's *exposure* under the two methods. Under the current rate method, exposure is defined as the net asset position of the subsidiary. A firm has a net asset position when its assets exceed its liabilities. Recall that under the current rate method, all of the assets and liabilities are translated at the current rate. Thus, it is the net assets, that is, the subsidiary's equity, that are exposed to changing exchange rates. So, if the subsidiary has a net asset exposure and the foreign currency is appreciating, a gain is recognized. Conversely, a net asset exposure in a depreciating environment will result in a loss.



*Professor's Note: Although it is possible for a firm to have a net liability position under the current rate method, it is unusual. Most firms can't survive very long when their liabilities exceed their assets.*

Recall that under the temporal method, the nonmonetary assets and liabilities are remeasured at historical rates. Thus, only the monetary assets and liabilities are exposed to changing exchange rates. Therefore, under the temporal method, exposure is defined

as the subsidiary's net monetary asset or net monetary liability position. A firm has net monetary assets if its monetary assets exceed its monetary liabilities. If the monetary liabilities exceed the monetary assets, the firm has a net monetary liability exposure.

Since very few assets are considered to be monetary (mainly cash and receivables), most firms have net monetary liability exposures. If the parent has a net monetary liability exposure when the foreign currency is appreciating, the result is a loss. Conversely, a net monetary liability exposure coupled with a depreciating currency will result in a gain.

Under the temporal method, firms can eliminate their exposure to changing exchange rates by balancing monetary assets and monetary liabilities. When balanced, no gain or loss is recognized. For example, assume a U.S. multinational firm has a net monetary liability exposure of €1 million. In this case, a loss will occur if the euro appreciates relative to the dollar. To eliminate the exposure, the firm could sell euro denominated nonmonetary assets, such as fixed assets or inventory, and use the proceeds to reduce the monetary liabilities.

Eliminating exposure under the current rate method is more difficult because it is necessary to balance total assets and total liabilities. Balancing assets and liabilities would eliminate shareholders' equity.



*Professor's Note: There are other ways of eliminating exposure using various hedging techniques. However, the specifics of hedging are beyond the scope of this topic review.*

Figure 2 summarizes the impact of changing exchange rates on the parent's exposure.

**Figure 2: Impact of Changing Exchange Rates on Exposure**

Exposure	Foreign Currency	
	Appreciating	Depreciating
<i>Current rate method:</i>		
Net assets	Gain	Loss
Net liabilities	Loss	Gain
<i>Temporal method:</i>		
Net monetary assets	Gain	Loss
Net monetary liabilities	Loss	Gain

### Calculating the Translation/Remeasurement Gain or Loss

Recall that under the current rate method, the translation gain or loss is reported in shareholders' equity as a part of the CTA. The CTA is simply a "plug" figure that forces the basic accounting equation ( $A = L + E$ ) to balance.

Let's try an example.

**Example: Calculating the ending balance of the CTA under the current rate method**

Given the following balance sheet data, calculate the ending balance of the CTA.

Assets	\$1,000
Liabilities	600
Common stock	150
Beginning retained earnings	175
Current period net income	50
Dividends paid	25

First, we need to calculate the ending balance of retained earnings. Given the beginning balance of retained earnings, the current period net income, and the dividends paid, we can calculate the ending balance of retained earnings as \$200 (\$175 beginning retained earnings + \$50 net income – \$25 dividends paid). Now, we can force the accounting equation to balance with a CTA of \$50 (\$1,000 assets – \$600 liabilities – \$150 common stock – \$200 ending retained earnings).

It is important to understand that the CTA is an accumulated balance of all of the translation gains and losses at a point in time. In order to compute the translation gain or loss for a specific period, we need the *change* in the CTA for the period. Returning to our example, if the beginning balance of the CTA was \$20 and the ending balance (plug) was \$50, the translation gain for the period was \$30.

Under the temporal method, no CTA is reported in shareholders' equity. Instead, the remeasurement gain or loss is recognized in the income statement. The remeasurement gain or loss is also a plug figure and is simply the difference in the earnings before the gain or loss and the earnings after the gain or loss.

Let's summarize what we have learned about the temporal and current rate methods.



*Professor's Note: Figure 3 is an absolute must-know for the exam. Memorize it!*

Figure 3: Summary of Temporal Method and Current Rate Method

	<i>Temporal Method</i>	<i>Current Rate Method</i>
Monetary assets and liabilities	Current rate	Current rate
Nonmonetary assets and liabilities	Historical rates	Current rate
Common stock	Historical rates	Historical rates
Equity (taken as a whole)	Mixed*	Current rate**
Revenues and SG&A	Average rate	Average rate
Cost of goods sold	Historical rates	Average rate
Depreciation and amortization	Historical rates	Average rate
Net income	Mixed*	Average rate
Exposure	Net monetary assets	Net assets
Exchange rate gain or loss	Income statement	Equity

\* Net income is remeasured at a “mixed rate” (i.e., a mix of the average rate and the historical rate) under the temporal method because (1) the FX gain or loss is shown in the income statement, and (2) revenues and SG&A are remeasured at the average rate while COGS, depreciation, and amortization are remeasured at the historical rate. Equity is “mixed” because the change in retained earnings (which includes net income) is mixed.

\*\* Under the current rate method, total assets and liabilities are translated at the current rate. The total equity (equity taken as a whole) would then have to be translated at the current rate for the balance sheet to balance.

**LOS 25.d: Calculate the translation effects, evaluate the translation of a subsidiary’s balance sheet and income statement into the parent company’s currency, and analyze the different effects of the current rate method and the temporal method on the subsidiary’s financial ratios.**

Let’s look at extended examples of both translation methods.

## CURRENT RATE METHOD

### Example: The current rate method

FlexCo International is a U.S. company with a subsidiary, Vibrant, Inc., located in the country of Martonia. Vibrant was acquired by FlexCo on 12/31/2006. FlexCo reports its financial results in U.S. dollars. The currency of Martonia is the loca (LC). Vibrant’s financial statements for 2007 are shown in the following two figures.



**Vibrant December 31, 2006 and 2007 Balance Sheet**

	<i>2006</i>	<i>2007</i>
Cash	LC100	LC100
Accounts receivable	500	650
Inventory	<u>1,000</u>	<u>1,200</u>
Current assets	<u>LC1,600</u>	<u>LC1,950</u>
Fixed assets	800	1,600
Accumulated depreciation	<u>(100)</u>	<u>(700)</u>
Net fixed assets	<u>LC700</u>	<u>LC900</u>
Total assets	<u><u>LC2,300</u></u>	<u><u>LC2,850</u></u>
Accounts payable	400	500
Current debt	100	200
Long-term debt	<u>1,300</u>	<u>950</u>
Total liabilities	<u>LC1,800</u>	<u>LC1,650</u>
Common stock	400	400
Retained earnings*	<u>100</u>	<u>800</u>
Total equity	<u>LC500</u>	<u>LC1,200</u>
Total liabilities and equity	<u>LC2,300</u>	<u>LC2,850</u>

\*Retained earnings on December 31, 2006, were \$50.

**Vibrant 2007 Income Statement**

	<i>2007</i>
Revenue	LC5,000
Cost of goods sold	<u>(3,300)</u>
Gross margin	1,700
Other expenses	(400)
Depreciation expense	<u>(600)</u>
Net income	LC700

The following exchange rates between the U.S. dollar and the loca were observed:

- December 31, 2006: \$0.50 = LC1.00.
- December 31, 2007: \$0.4545 = LC1.00.
- Average for 2007: \$0.4762 = LC1.00.
- Historical rate for equity: \$0.50 = LC1.00.
- Historical rate for fixed assets: \$0.4881 = LC1.00.
- Historical rate for accumulated depreciation = \$0.4896 = LC1.00.
- Historical rate for COGS = \$0.4834 = LC1.00.
- Historical rate for depreciation = \$0.4878 = LC1.00.
- Use the average rate to value ending inventory.

The majority of Vibrant's operational, financial, and investment decisions are made locally in Martonia, although Vibrant does rely on FlexCo for information technology expertise.

Use the appropriate method to translate Vibrant's 2007 balance sheet and income statement into U.S. dollars.

**Answer:**

Vibrant is relatively self-contained, which likely means the loca is the functional currency. Since the functional currency  $\neq$  the parent's presentation currency, the current rate method is used to translate Vibrant's financial statements from the functional currency to the parent's presentation currency. The current rate method uses the current rate for all balance sheet accounts (except common stock, which is translated at the historical rate) and the average rate for all income statement accounts. The translation gain or loss is included in the CTA, which is reported in the equity section of the balance sheet as a part of other comprehensive income.

Vibrant's translated 2007 income statement is shown in the following table. Notice that we translate the income statement first with the current rate method to derive net income, which we then use to calculate retained earnings on the balance sheet.

**Vibrant's 2007 Translated Income Statement Under the Current Rate Method**

	<i>2007 (LC)</i>	<i>Rate</i>	<i>2007 (\$)</i>
Revenue	LC5,000	\$0.4762	\$2,381.0
Cost of goods sold	<u>(3,300)</u>	\$0.4762	<u>(1,571.5)</u>
Gross margin	1,700		809.5
Other expenses	(400)	\$0.4762	(190.5)
Depreciation expense	<u>(600)</u>	\$0.4762	<u>(285.7)</u>
Net income	LC700		\$333.3

Vibrant's 2007 translated balance sheet is shown in the next table.

## Vibrant 2007 Translated Balance Sheet Under the Current Rate Method

	<i>2007 (LC)</i>	<i>Rate</i>	<i>2007 (\$)</i>
Cash	LC100	\$0.4545	\$45.5
Accounts receivable	650	\$0.4545	295.4
Inventory	<u>1,200</u>	\$0.4545	<u>545.4</u>
Current assets	<u>LC1,950</u>		<u>\$886.3</u>
Fixed assets	1,600	\$0.4545	727.2
Accumulated depreciation	<u>(700)</u>	\$0.4545	<u>(318.2)</u>
Net fixed assets	<u>LC900</u>		<u>\$409.0</u>
Total assets	<u>LC2,850</u>		<u>\$1,295.3</u>
Accounts payable	500	\$0.4545	227.2
Current debt	200	\$0.4545	90.9
Long-term debt	<u>950</u>	\$0.4545	<u>431.8</u>
Total liabilities	<u>LC1,650</u>		<u>\$749.9</u>
Common stock	400	\$0.50	200.0
Retained earnings	800	(a)	383.3
Cumulative translation adjustment	—	(b)	<u>(37.9)</u>
Total equity	<u>LC1,200</u>		<u>\$545.4</u>
Total liabilities and shareholders' equity	<u>LC2,850</u>		<u>\$1,295.3</u>

(a) Beginning (2007) retained earnings were \$50, so ending (2007) retained earnings are \$50 + \$333.3 = \$383.3.

(b) The CTA is a plug figure that makes the accounting equation balance: \$1,295.3 assets – \$749.9 liabilities – \$200.0 common stock – \$383.3 retained earnings = –\$37.9.

Notice the change in the CTA from 2006 to 2007 is equal to –\$37.9 (–\$37.9 ending CTA – \$0 beginning CTA). Because Vibrant was acquired at the end of 2006, the CTA was zero on that date. Thus, the depreciating loca resulted in translation loss of \$37.9 for the year ended 2007. The translation loss occurred because Vibrant had a net asset exposure (assets > liabilities) and the loca depreciated relative to the dollar.

## TEMPORAL METHOD

Now let's apply the temporal method to Vibrant.

### Example: The temporal method

Suppose instead that the majority of Vibrant's operational, financial, and investment decisions are made by the parent company, FlexCo. In this case, Vibrant's functional currency and FlexCo's presentation currency are likely the same; thus, the temporal method is used to remeasure the loca to the dollar. All other information is the same.

Use the appropriate method to translate Vibrant's 2007 balance sheet and income statement into U.S. dollars.

Under the temporal method, we'll start with the balance sheet.

#### Vibrant 2007 Remeasured Balance Sheet Under the Temporal Method

	<i>2007 (LC)</i>	<i>Rate</i>	<i>2007 (\$)</i>
Cash	LC100	\$0.4545	\$45.5
Accounts receivable	650	\$0.4545	295.4
Inventory	<u>1,200</u>	\$0.4762	<u>571.4</u>
Current assets	<u>LC1,950</u>		<u>\$912.3</u>
Fixed assets	1,600	\$0.4881	781.0
Accumulated depreciation	<u>(700)</u>	\$0.4896	<u>(342.7)</u>
Net fixed assets	<u>LC900</u>		<u>\$438.3</u>
Total assets	<u>LC2,850</u>		<u>\$1,350.6</u>
Accounts payable	500	\$0.4545	227.2
Current debt	200	\$0.4545	90.9
Long-term debt	<u>950</u>	\$0.4545	<u>431.8</u>
Total liabilities	<u>LC1,650</u>		<u>\$749.9</u>
Common stock	400	\$0.50	200.0
Retained earnings	<u>800</u>	(a)	<u>400.7</u>
Total equity	<u>LC1,200</u>		<u>600.7</u>
Total liabilities and shareholders' equity	<u>LC2,850</u>		<u>\$1,350.6</u>

(a) Retained earnings is a plug figure that makes the accounting equation balance:  
 $\$1,350.6 \text{ assets} - \$749.9 \text{ liabilities} - \$200.0 \text{ common stock} = \$400.7 \text{ retained earnings.}$

Vibrant's remeasured income statement using the temporal method is shown in the following table. Remember the remeasurement gain or loss appears in the income statement under the temporal method.

**Vibrant's 2007 Remeasured Income Statement Under the Temporal Method**

	<i>2007 (LC)</i>	<i>Rate</i>	<i>2007 (\$)</i>
Revenue	LC5,000	\$0.4762	\$2,381.0
Cost of goods sold	<u>(3,300)</u>	\$0.4834	<u>(1,595.3)</u>
Gross margin	1,700		785.7
Other expenses	(400)	\$0.4762	(190.5)
Depreciation expense	<u>(600)</u>	\$0.4878	<u>(292.7)</u>
Income before remeasurement gain	700		302.5
Remeasurement gain	—	(b)	<u>48.2</u>
Net income	LC700	(a)	\$350.7

(a) Net income is derived from the beginning and ending balances of retained earnings and dividends paid: (\$50.0 beginning balance + net income – \$0 dividends paid = \$400.7 ending balance). Solving for net income, we get \$350.7.

(b) The remeasurement gain is a plug that is equal to the difference in net income and income before remeasurement gain: \$350.7 – \$302.5 = \$48.2.

The remeasurement gain occurred because Vibrant had a net monetary liability exposure (monetary liabilities > monetary assets), and the loca depreciated relative to the dollar.

### Why Do the Two Methods Report Significantly Different Results?

You should immediately notice that the two different methods report very different results, particularly related to the size and sign of the translation gain/loss, net income, and total assets. These comparisons are shown in Figure 4.

**Figure 4: Vibrant Example: Current Rate vs. Temporal Method**

	<i>Current Rate</i>	<i>Temporal</i>
Income before translation gain/loss	\$333.3	\$302.5
Translation gain/loss	–\$37.9	\$48.2
	(on the balance sheet)	(on the income statement)
Net income	\$333.3	\$350.7
Total assets	\$1,295.3	\$1,350.6

We can make the following observations.

*Income before translation gain/loss is different between the two methods.* This is because COGS and depreciation are translated/remeasured at different rates under the two methods. Under the current rate method, COGS and depreciation expense are translated at the average rate thereby reflecting the depreciating local currency. Under the temporal method, COGS and depreciation expense are remeasured at historical (actual) rates, and thus, do not reflect the depreciating local currency.

*The translation gain/loss is different between the two methods; it's not even the same sign.* The current rate method results in a translation loss, while the temporal method results in a translation gain. This is NOT an unusual occurrence. Under the current rate method, Vibrant's net assets (assets > liabilities) are exposed to the depreciating local currency. Holding net assets in a depreciating environment results in a loss. Under the temporal method, Vibrant's net monetary liabilities (monetary liabilities > monetary assets) are exposed. Holding net monetary liabilities in a depreciating environment results in a gain.

*Net income is different between the two methods.* This is because of the different exchange rates used to translate/remeasure COGS and depreciation expense as previously discussed. In addition, the gain/loss recognized under the two methods are reported in different financial statements. Under the current rate method, the translation loss is reported in shareholders' equity as a part of the CTA. Under the temporal method, the remeasurement gain is reported in the income statement. Reporting the gain or loss in the income statement results in more volatile net income.

*Total assets are different between the two methods because inventory and net fixed assets are different.* Inventory and fixed assets are translated at the current rate under the current rate method thereby reflecting the depreciating local currency. Under the temporal method, the historical rate is used, thus, inventory and fixed assets do not reflect the depreciating local currency.

### Comparing Subsidiary Results to Translated Results Under the Current Rate Method

A side-by-side comparison of Vibrant's 2007 balance sheet and income statement before and after translation is presented in Figure 5.

Figure 5: Vibrant LC and Translated Balance Sheet and Income Statement

	2007 (LC)	2007 (\$) <i>Current Rate Method</i>
Cash	LC100	\$45.5
Accounts receivable	650	295.4
Inventory	<u>1,200</u>	<u>545.4</u>
Current assets	<u>LC1,950</u>	<u>\$886.3</u>
Fixed assets	1,600	727.2
Accumulated depreciation	<u>(700)</u>	<u>(318.2)</u>
Net fixed assets	<u>LC900</u>	<u>\$409.0</u>
 Total assets	 <u>LC2,850</u>	 <u>\$1,295.3</u>
 Accounts payable	 500	 227.2
Current debt	200	90.9
Long-term debt	<u>950</u>	<u>431.8</u>
Total liabilities	<u>LC1,650</u>	<u>\$749.9</u>
Common stock	400	200.0
Retained earnings	800	383.3
Cumulative translation adjustment	—	<u>(37.9)</u>
Total equity	<u>LC1,200</u>	<u>\$545.4</u>
Total liabilities and shareholders' equity	<u>LC2,850</u>	<u>\$1,295.3</u>
 Revenue	 LC5,000	 \$2,381.0
Cost of goods sold	<u>(3,300)</u>	<u>(1,571.5)</u>
Gross margin	1,700	809.5
Other expenses	(400)	(190.5)
Depreciation expense	<u>(600)</u>	<u>(285.7)</u>
Net income	LC700	\$333.3

### LOS 25.e: Analyze how using the temporal method versus the current rate method will affect the parent company's financial ratios.

#### Pure Balance Sheet and Pure Income Statement Ratios

Pure income statement and pure balance sheet ratios are *unaffected* by the application of the current rate method. In other words, the local currency trends and relationships are “preserved.” What we mean by “pure” is that all of the components of the ratio are from the balance sheet, or all of the components are from the income statement.

For example, the current ratio (current assets / current liabilities) is a pure balance sheet ratio because both the numerator and denominator are from the balance sheet and are translated at the current rate. If you multiply both numerator and denominator by the same exchange rate, the rate cancels, and you're left with the same ratio.

All profit margin measures are pure income statement ratios because both the numerator (gross profit, operating profit, or net profit) and the denominator (revenue) are from the income statement and are translated at the average rate.

Selected pure balance sheet and pure income statement ratios from the Vibrant example are presented in Figure 6. Notice the current rate method preserves the original LC ratio in each case.

**Figure 6: Vibrant Pure Balance Sheet and Pure Income Statement Ratios**

<i>Ratio</i>	<i>2006 (LC)</i>	<i>2006 (\$) Current Rate Method</i>
<i>Pure Balance Sheet Ratios</i>		
Current ratio	2.79	2.79
Quick ratio	1.07	1.07
LTD-to-total capital	0.44	0.44
<i>Pure Income Statement Ratios</i>		
Gross profit margin	34.0%	34.0%
Net profit margin	14.0%	14.0%



*Professor's Note: Interest coverage (EBIT/Interest expense) is another example of a pure income statement ratio.*

#### Mixed Balance Sheet/Income Statement Ratios

A **mixed ratio** combines inputs from both the income statement and balance sheet. The current rate method results in small changes in mixed ratios because the numerator and the denominator are almost always translated at different exchange rates. The change will likely be small and the direction will depend on the relationship between the



exchange rate used to translate the denominator and the exchange rate used to translate the numerator.

Our analysis of mixed ratios isn't as clear-cut as the analysis of pure ratios, but we can make one definitive statement: *mixed ratios calculated from financial statements translated using the current rate method will be different than the same ratio calculated from the local currency statements before translation.* However, we can't make any definitive statements about whether specific ratios will be larger or smaller after translation unless we make the assumption that all mixed ratios are calculated using end-of-period balance sheet figures. The analysis that follows does not necessarily apply for mixed ratios calculated using beginning or average balance sheet figures.

This is a very important point so we'll repeat it again: the conclusions drawn in the following section assume we're using end-of-period balance sheet figures.

Selected mixed balance sheet and income statement ratios from the Vibrant example are presented in Figure 7. Recall that during 2007, the loca depreciated relative to the parent's presentation currency, the U.S. dollar.

**Figure 7: Vibrant Mixed Balance Sheet/Income Statement Ratios (Depreciating LC)**

<i>Ratio*</i>	<i>2007 (LC)</i>	<i>2007 (\$) Current Rate Method</i>
Return on assets	24.6%	25.7%
Return on equity	58.3%	61.1%
Total asset turnover	1.75	1.84
Inventory turnover	2.75	2.88
Accounts receivable turnover	7.69	8.06

\*Ratios are calculated using end-of-period balance sheet numbers.

Notice that in each case the translated ratio is larger than the original ratio. This will always be the case when the foreign currency is depreciating because the average rate (which is used in the numerator of the ratio) is greater than the ending rate (which is used in the denominator of the ratio). When the foreign currency is appreciating, each of these ratios will decrease.



*Professor's Note: In the Level 2 curriculum, we don't run across many mixed ratios with a balance sheet item in the numerator and an income statement item in the denominator. However, one example is the receivables collection period. Just remember that if accounts receivable turnover increases, receivables collection period will decrease. The same is true for the inventory processing period.*

On the exam, remember these key points regarding the original versus the translated financial statements and ratios:

- Pure balance sheet and pure income statement ratios will be the same.
- If the foreign currency is depreciating, translated mixed ratios (with an income statement item in the numerator and an end-of-period balance sheet item in the denominator) will be larger than the original ratio.
- If the foreign currency is appreciating, translated mixed ratios (with an income statement item in the numerator and an end-of-period balance sheet item in the denominator) will be smaller than the original ratio.

### Comparing Results Using the Temporal Method and Current Rate Method

Now, let's compare the results of the temporal method and current rate method as they relate to Vibrant's 2007 balance sheet and income statement.

**Figure 8: Comparison of Vibrant's Balance Sheet and Income Statement Using the Temporal Method and the Current Rate Method**

	<i>2007 (\$) Temporal Method</i>	<i>2007 (\$) Current Rate Method</i>
Cash	\$45.5	\$45.5
Accounts receivable	295.4	295.4
Inventory	<u>571.4</u>	<u>545.4</u>
Current assets	<u>\$912.3</u>	<u>\$886.3</u>
Fixed assets	781.0	727.2
Accumulated depreciation	<u>(342.7)</u>	<u>(318.2)</u>
Net fixed assets	<u>438.3</u>	<u>409.0</u>
 Total assets	 <u>\$1,350.6</u>	 <u>\$1,295.3</u>
 Accounts payable	 227.2	 227.2
Current debt	90.9	90.9
Long-term debt	<u>431.8</u>	<u>431.8</u>
Total liabilities	<u>\$749.9</u>	<u>\$749.9</u>
Common stock	200.0	200.0
Retained earnings	400.7	383.3
Cumulative translation adjustment	—	<u>(37.9)</u>
Total equity	<u>600.7</u>	<u>\$545.4</u>
Total liabilities and shareholders' equity	<u>\$1,350.6</u>	<u>\$1,295.3</u>

**Figure 8: Comparison of Vibrant's Balance Sheet and Income Statement Using the Temporal Method and the Current Rate Method (cont.)**

	2007 (\$) <i>Temporal Method</i>	2007 (\$) <i>Current Rate Method</i>
Revenue	\$2,381.0	\$2,381.0
Cost of goods sold	<u>(1,595.3)</u>	<u>(1,571.5)</u>
Gross margin	785.7	809.5
Other expenses	(190.5)	(190.5)
Depreciation expense	<u>(292.7)</u>	<u>(285.7)</u>
Income before remeasurement gain	302.5	333.3
Remeasurement gain	<u>48.2</u>	—
Net income	\$350.7	\$333.3

Please note that this analysis assumes **end-of-period balance sheet figures**.

Analyzing the effect on the financial ratios of the choice of accounting method is a little more difficult in this case, but the basic procedure is as follows:

- Determine whether the foreign currency is appreciating or depreciating.
- Determine which rate (historical rate, average rate, or current rate) is used to convert the numerator under both methods. Determine whether the numerator of the ratio will be the same, larger, or smaller under the temporal method versus the current rate method.
- Determine which rate (historical rate, average rate, or current rate) is used to convert the denominator under both methods. Determine whether the denominator of the ratio will be the same, larger, or smaller under the temporal method versus the current rate method.
- Determine whether the ratio will increase, decrease, or stay the same based on the direction of change in the numerator and the denominator.

For example, let's analyze the fixed asset turnover ratio, which is equal to revenue divided by fixed assets. Assume the foreign currency is depreciating.

- The numerator (revenue) is converted at the same rate (the average rate) under both methods.
- The denominator (fixed assets) is converted at the historical rate under the temporal method and the current rate under the current rate method. If the foreign currency is depreciating, the historical rate will be higher than the current rate, which means fixed assets will be higher under the temporal method.
- Since fixed assets are higher, turnover will be lower under the temporal method (higher denominator).

### LOS 25.f: Illustrate and analyze alternative accounting methods for subsidiaries operating in hyperinflationary economies.

In a hyperinflationary environment, the local currency will rapidly depreciate relative to the parent's presentation currency because of a deterioration of purchasing power. In this case, using the current rate to translate all of the balance sheet accounts will result in much lower assets and liabilities after translation. Using the lower values, the subsidiary seems to disappear in the parent's consolidated financial statements.

In reality, the real value of the nonmonetary assets and liabilities is typically not affected by hyperinflation because the local currency-denominated values increase to offset the impact of inflation (e.g., real estate values rise with inflation). Unfortunately, adjusting the nonmonetary asset and liabilities for inflation is not allowed under U.S. GAAP; although, adjusting for inflation is permitted under IFRS. As a result, IFRS and U.S. GAAP differ significantly when dealing with a subsidiary operating in a hyperinflationary environment.

According to the FASB, a hyperinflationary environment is one where cumulative inflation exceeds 100% over a 3-year period. Assuming compounding, an annual inflation rate of more than 26% over three years will result in cumulative inflation over 100% ( $1.26^3 - 1$  is approximately equal to 100%). When hyperinflation is present, the functional currency is considered to be the parent's presentation currency; thus, the temporal method is used to remeasure the financial statements.

The IASB does not specifically define hyperinflation; however, cumulative inflation of over 100% in a 3-year period is one indication that hyperinflation exists.

Unlike U.S. GAAP, the temporal method is not used in a hyperinflationary environment under IFRS. Instead, the foreign currency financial statements are restated for inflation and then translated using the current rate method. Restating for inflation involves the following procedures:

- Nonmonetary assets and nonmonetary liabilities are restated for inflation using a price index. Since most nonmonetary items are reported at historical cost, simply multiply the original cost by the change in the price index for the period between the acquisition date and the balance sheet date.
- It is not necessary to restate monetary assets and monetary liabilities.
- The components of shareholders' equity are restated by applying the change in the price index from the beginning of the period or the date of contribution if later.
- The income statement items are restated by multiplying by the change in the price index from the date the transactions occur.
- The net purchasing power gain or loss is recognized in the income statement based on the net monetary asset or liability exposure. Holding monetary assets during inflation results in a purchasing power loss. Conversely, holding monetary liabilities during inflation results in a purchasing power gain.

Let's look at an example.

**Example: Adjusting financial statements for inflation**

Assume a foreign subsidiary was created on December 31, 2006. The LC is the currency of the country where the foreign subsidiary is located. The subsidiary's balance sheets for 2006 and 2007, and income statement for the year-ended 2007, are shown below:

<i>(in LCs)</i>	<i>2006</i>	<i>2007</i>
Cash	5,000	8,000
Supplies	<u>25,000</u>	<u>25,000</u>
Total assets	30,000	33,000
Accounts payable	20,000	20,000
Common stock	10,000	10,000
Retained earnings	<u>0</u>	<u>3,000</u>
Liabilities and equity	30,000	33,000
Revenue		15,000
Expenses		<u>(12,000)</u>
Net income		3,000

Also, assume the following price indices:

December 31, 2006	100
December 31, 2007	150
Average for 2007	125

Prepare an inflation adjusted balance sheet and income statement for 2007.

**Answer:**

<i>(in LCs)</i>	<i>2007</i>	<i>Adjustment Factor</i>	<i>Inflation Adjusted</i>
Cash	8,000		8,000
Supplies	<u>25,000</u>	150 / 100	<u>37,500</u>
Total assets	33,000		45,500
Accounts payable	20,000		20,000
Common stock	10,000	150 / 100	15,000
Retained earnings	<u>3,000</u>		<u>10,500</u>
Liabilities and equity	33,000		45,500
Revenue	15,000	150 / 125	18,000
Expenses	(12,000)	150 / 125	(14,400)
Net purchasing power gain	<u>        </u>		<u>6,900</u>
Net income	3,000		10,500

The nonmonetary assets (supplies) and the common stock are inflation adjusted based on the change in the beginning and ending price index because the amounts were outstanding for the entire year. The revenues and expenses occurred throughout the year and are inflation adjusted using the change in the average and ending price index. Notice the monetary assets (cash) and monetary liabilities (accounts payable) are not inflation adjusted. Instead, the purchasing power gains and losses are calculated.

Inflation results in a purchasing power loss of LC2,500 on the beginning cash balance  $[-LC5,000 \times (150 - 100) / 100]$  and a loss of LC600 on the increase in cash  $[-LC3,000 \times (150 - 125) / 125]$ . Additionally, inflation results in a purchasing power gain of LC10,000 on the accounts payable  $[LC20,000 \times (150 - 100) / 100]$ . Thus, adjusting for inflation will result in a net purchasing power gain of LC6,900  $(-LC2,500 \text{ loss on beginning cash} - LC600 \text{ loss on increase in cash} + LC10,000 \text{ gain on accounts payable})$ .

Notice the similarities of adjusting the financial statements for inflation and remeasuring the financial statements using the temporal method.

- Under the temporal method, the monetary assets and liabilities are exposed to changing exchange rates. Similarly, it is the monetary assets and liabilities that are exposed to the risk of inflation.
- Purchasing power gains and losses are analogous to exchange rate gains and losses when the foreign currency is depreciating. For example, if a subsidiary has net monetary liability exposure in a depreciating environment, a gain is recognized under the temporal method. Likewise, a purchasing power gain is recognized when a net monetary liability exposure is adjusted for the effects of inflation.
- The gain or loss from remeasurement is recognized in the income statement as is the net purchasing power gain or loss that results from inflation.

Under IFRS, once the subsidiary's financial statements are adjusted for inflation, the current rate method is used to translate the financial statements into the parent's presentation currency.

## Analyzing Foreign Currency Disclosure

Up to this point, we have examined a multinational parent with only one subsidiary. This made the analysis easier (although it sure doesn't seem that way) because we were able to link the effect of the choice of translation method to the consolidated financial statements for the specific subsidiary.

However, in practice, multinational firms may have many foreign subsidiaries, which means that the CTA on the balance sheet, the remeasurement gain or loss in the income statement, and the parent company's ratios include the effects of all of the subsidiaries. Unfortunately, disclosure requirements are limited, so it is difficult for the analyst to get information about the firm's currencies and the specific exposure to the currencies. In some cases, it is even difficult to determine what accounting method (temporal or current rate) the firm uses for its various foreign operations.

What little information that is available is found in the financial statement footnotes and the management discussion and analysis section of the annual report.

As previously discussed, management judgment is involved in deciding on the functional currency of a foreign subsidiary. Firms operating in the same industry may use different methods for translation purposes thereby making comparisons more difficult. One solution involves adding the change in the CTA to the firm's net income. Recall the change in the CTA is equal to the translation gain or loss for the period. By bringing the translation gain or loss into the income statement, comparisons with a temporal method firm are improved. The solution does not totally resolve the problem but it is a good start.

The same solution can be applied to all nonowner changes in shareholders' equity. For example, adding the unrealized gains and losses from available-for-sale securities to net income would allow an analyst to compare the company to a firm that owns held-for-trading securities.

Including the gains and losses (that are reported in shareholders' equity) in net income is known as *clean-surplus accounting* in the analytical community. The term *dirty-surplus* is used to describe gains and losses that are reported in shareholders' equity.

## KEY CONCEPTS

### LOS 25.a

The local currency is the currency of the country to which it refers.

The functional currency, determined by management, is the currency of the primary economic environment in which the entity operates. The functional currency is usually the currency in which the entity generates and expends cash. It can be the local currency or some other currency.

The presentation (reporting) currency is the currency in which the entity prepares its financial statements.

### LOS 25.b

Foreign currency denominated transactions, including sales, are measured in the presentation (reporting) currency at the spot rate on the transaction date. If the exchange rate changes, gain or loss is recognized on the settlement date.

If the balance sheet date occurs before the transaction is settled, gain or loss is based on the exchange rate on the balance sheet date. Once the transaction is settled, additional gain or loss is recognized if the exchange rate changes after the balance sheet date.

### LOS 25.c

If the functional currency and the parent's presentation currency differ, the current rate method is used to translate the subsidiary's financial statements. This usually occurs when the subsidiary is relatively independent of the parent. Under the current rate method, all assets and liabilities are translated at the current rate; common stock and dividends paid at the historic rate; and revenues and expenses at the average rate. Translation gains and losses are reported in equity in the CTA account. The CTA is a plug figure that makes the accounting equation balance.

If the functional currency is the same as the parent's presentation currency, the temporal method is used to remeasure the subsidiary's financial statements. This usually occurs when the subsidiary is well integrated with the parent. Under the temporal method:

- Monetary assets and liabilities are remeasured at the current rate.
- Nonmonetary assets and liabilities are remeasured at the historical rate.
- Common stock and dividends paid are remeasured at the historical rate.
- COGS, depreciation, and amortization expense are remeasured at the historical rate.
- All other revenues and expenses are remeasured at the average rate.
- Remeasurement gains and losses are reported in the income statement.



**LOS 25.d**

Under the current rate method, exposure is defined as the net asset position (assets – liabilities) of the subsidiary. Under the temporal method, exposure is defined as the net monetary asset or net monetary liability position of the subsidiary. When assets are exposed to a depreciating foreign currency, a loss results. When liabilities are exposed to a depreciating foreign currency, a gain results.

The local currency trends and relationships of pure balance sheet and income statement ratios are preserved under the current rate method. When compared to the local currency mixed ratios will differ after translation.

**LOS 25.e**

In comparing the ratio effects of the temporal method and current rate method, it is necessary to:

- Determine whether the local currency is appreciating or depreciating.
- Determine which rate (historical rate, average rate, or current rate) is used to convert the numerator under both methods and analyze the effects on the ratio.
- Determine which rate (historical rate, average rate, or current rate) is used to convert the denominator under both methods and analyze the effects on the ratio.
- Determine whether the ratio will increase, decrease, or stay the same based on the direction of change in the numerator and the denominator.

**LOS 25.f**

A hyperinflationary environment is one where cumulative inflation exceeds 100% over a 3-year period (more than 26% annual inflation). Under U.S. GAAP, the temporal method is required when the subsidiary is operating in a hyperinflationary environment. Under IFRS, the foreign currency financial statements are first restated for inflation and then translated using the current rate method. Restating for inflation results in recognition of the net purchasing power gain or loss which is based on the net monetary asset or liability of the subsidiary.

**CONCEPT CHECKERS**

1. Which of the following statements is *most accurate* regarding foreign currency translation? Under the:
  - A. temporal method, the monetary asset accounts of a foreign subsidiary are translated using the current rate.
  - B. temporal method, the nonmonetary asset accounts of a foreign subsidiary are translated using the current rate.
  - C. current rate method, all balance sheet accounts of a foreign subsidiary are translated using the average rate.
2. Which of the following is *least likely* a condition that requires the use of the temporal method for a U.S. parent that reports results in U.S. dollars?
  - A. The functional currency is the local currency.
  - B. The foreign subsidiary is operating in a highly inflationary economy.
  - C. The functional currency is some currency other than the local currency or the U.S. dollar.
3. XYZ Company is a U.S. subsidiary that operates in the United Kingdom where the functional currency is the British pound (£). XYZ's income statement shows £400 of net income and a £100 dividend that was paid on October 31 when the exchange rate was \$1.60 per £. The current exchange rate is \$1.70 per £, and the average rate is \$1.55 per £. The change in retained earnings for the period in U.S. dollars is *closest* to:
  - A. \$460.
  - B. \$465.
  - C. \$480.
4. Which of the following ratios may be larger in the presentation currency versus the local currency when translated under the current rate method?
  - A. Current ratio.
  - B. Return on assets.
  - C. Net profit margin.
5. Mazeppa, Inc., is a multinational firm with its home office located in Toronto, Canada. Its main foreign subsidiary is located in Paris, but the primary economic environment in which the foreign subsidiary generates and expends cash is in the United States (New York). The:
  - A. local currency is the U.S. dollar.
  - B. functional currency is the euro.
  - C. presentation (reporting) currency is the Canadian dollar.

6. On December 15, 2007, a U.S. firm sold merchandise to a Mexican firm. Payment (in pesos) was due in 30 days but was actually received on January 20, 2008. Using the following exchange rates, what is the effect on the U.S. firm's income statement when payment is received?

	<u>USD:MXN</u>
December 15, 2007	10.0
December 31, 2007	12.0
January 15, 2008	12.5
January 20, 2008	11.5

- A. Gain.  
B. Loss.  
C. No effect.
7. A foreign subsidiary is operating in a country whereby the local currency is depreciating relative to the parent's presentation currency. Assuming the subsidiary is a FIFO firm, which accounting method will result in the highest gross profit margin reported in the parent's consolidated income statement?  
A. Current rate method.  
B. Temporal method.  
C. The current rate method and the temporal method will result in the same COGS.
8. Which of the following statements about the temporal method and the current rate method is *least accurate*?  
A. Net income is generally more volatile under the temporal method than under the current rate method.  
B. Subsidiaries that operate in highly inflationary environments will generally use the temporal method under U.S. GAAP.  
C. Subsidiaries whose operations are well integrated with the parent will generally use the current rate method.
9. Barkley Corporation, a wholly-owned subsidiary of a U.S. firm, is located in a country that is experiencing hyperinflation. Barkley's functional currency and the parent's presentation currency differ. What exchange rate should be used to convert Barkley's intangible assets into U.S. dollars according to U.S. GAAP?  
A. Historical rate.  
B. Current rate.  
C. Prime rate.
10. If a foreign subsidiary's functional currency and the parent's reporting currency are the same, the parent's exposure to changing exchange rates is based on:  
A. total assets minus total liabilities.  
B. monetary assets minus monetary liabilities.  
C. nonmonetary assets minus nonmonetary liabilities.

11. Tiny Company, a subsidiary of Large Corporation, operates in a country that is experiencing hyperinflation. Assuming Large follows IFRS, which of the following exposures will result in a net purchasing power gain?
- Nonmonetary assets and current liabilities.
  - Monetary liabilities.
  - Nonmonetary assets and nonmonetary liabilities.

## CHALLENGE PROBLEMS

Use the following information to answer Questions 12 through 15.

This information is a continuation of the FlexCo/Vibrant example from the topic review. Suppose it is now the end of 2008 and Vibrant reports the operating results shown in the following table.

**Vibrant December 31, 2007 and 2008 Balance Sheet**

	2007	2008
Cash	LC100	LC150
Accounts receivable	650	800
Inventory	<u>1,200</u>	<u>1,400</u>
Current assets	<u>LC1,950</u>	<u>LC2,350</u>
Fixed assets	1,600	2,500
Accumulated depreciation	<u>(700)</u>	<u>(1,500)</u>
Net fixed assets	<u>LC900</u>	<u>LC1,000</u>
 Total assets	 <u>LC2,850</u>	 <u>LC3,350</u>
 Accounts payable	 500	 500
Current debt	200	100
Long-term debt	<u>950</u>	<u>1,150</u>
Total liabilities	<u>LC1,650</u>	<u>LC1,750</u>
Common stock	400	400
Retained earnings*	<u>800</u>	<u>1,200</u>
Total equity	<u>LC1,200</u>	<u>LC1,600</u>
Total liabilities and equity	<u>LC2,850</u>	<u>LC3,350</u>

\*At the beginning of 2008, retained earnings were \$383.3.

**Vibrant 2008 Income Statement**

	2008
Revenue	LC5,500
Cost of goods sold	(3,800)
Gross margin	1,700
Other expenses	(500)
Depreciation expense	(800)
Net income	LC400

The following exchange rates between the U.S. dollar and the loca were observed:

- December 31, 2007: LC:USD 0.4545.
- December 31, 2008: LC:USD 0.4000.
- Average for 2008: LC:USD 0.4292.
- Historical rate for fixed assets, inventory, and equity: LC:USD 0.5000.

The CTA at the end of 2007 was equal to −\$37.9 under the current rate method.

- Assume for this question only that Vibrant operates relatively independently from FlexCo. For 2008, FlexCo *most likely* will report a cumulative translation loss on the consolidated:
  - income statement of \$77.1 related to Vibrant.
  - balance sheet of \$77.1 related to Vibrant.
  - balance sheet of \$115.0 related to Vibrant.
- The gross profit margin ratio and the return on assets ratio from Vibrant's 2008 U.S. dollar financial statements translated using the current rate method are *closest* to:
 

<u>Gross profit margin</u>	<u>Return on assets</u>
A. 22.7%	12.8%
B. 30.9%	12.8%
C. 30.9%	11.9%
- The gross profit margin ratio from Vibrant's 2008 U.S. dollar financial statements remeasured using the temporal method is:
  - lower.
  - the same.
  - higher.
- As compared to the current rate method, which of the following *best* describes the impact of the temporal method on accounts receivable turnover from Vibrant's 2008 U.S. dollar financial statements?
  - Higher.
  - Lower.
  - The same.

16. Bob Haskell, CFA, is analyzing the financial statements of a U.S.-based company called Seriev Motor. Seriev has a foreign subsidiary located in Japan. Seriev translates the subsidiary results using the current rate method. Haskell determines that the following four ratios will remain the same after translation from yen into U.S. dollars:
- Gross profit margin.
  - Interest coverage (EBIT/interest expense).
  - Return on assets.
  - Quick ratio.

The dollar has depreciated against the yen during the most recent year. Haskell is correct in his analysis of:

- A. all four ratios.
  - B. three of the four ratios.
  - C. two of the four ratios.
17. How many of the following situations *might* result in a translation gain?
- Total assets exceed total liabilities when the foreign currency is depreciating using the current rate method.
  - Monetary liabilities exceed monetary assets when the foreign currency is appreciating using the temporal method.
  - Monetary assets exceed monetary liabilities when the foreign currency is depreciating using the temporal method.
  - Total assets equal total liabilities when the foreign currency is appreciating using the current rate method.
- A. None.
  - B. One.
  - C. Two.

Use the following information to answer Questions 18 and 19.

Gila Sailing and Fishing, Inc. (Gila), is a subsidiary of Sea of Cortez Unlimited Boating Adventures, Inc. (Cortez), a multinational organization headquartered in Tempe, Arizona. Gila is located in the Sonora Valley and sells fishing trips off the coast of the Sea of Cortez. Cortez accounts for Gila using the temporal method. Gila's current balance sheet (denominated in pesos) is as follows:

Cash	1,000,000
Accounts receivable	11,000,000
Fixed assets	<u>43,000,000</u>
Total assets	55,000,000
Accounts payable	9,000,000
Deferred revenue	2,000,000*
LTD	8,000,000
Equity	<u>36,000,000</u>
Total liabilities and equity	55,000,000

\* Note: Deferred revenue relates to a wealthy customer who paid for several trips in advance but has been unable to find enough spare time to come back to Sonora.

18. Nonmonetary assets less nonmonetary liabilities are:
  - A. 5,000,000.
  - B. 41,000,000.
  - C. 43,000,000.
  
19. Cortez is concerned about depreciation of the peso and would like to change Gila's capital structure. This would be *best* accomplished by:
  - A. borrowing pesos and reducing equity.
  - B. using cash to reduce accounts payable.
  - C. selling receivables and using the proceeds to pay down LTD.

## ANSWERS – CONCEPT CHECKERS

1. A Monetary asset accounts of a foreign subsidiary are translated using the current rate under the temporal method.
2. A If the functional currency is the local currency, then the functional currency and the parent's presentation currency are different. In this case, the current rate method is used.
3. A Since the functional currency (£) differs from the parent's presentation currency (\$), the current rate method is used. Under the current rate method, net income is translated at the average rate. Dividends are translated at the historical rate on the date the dividends were paid.  
  

$$(\$1.55/\text{£} \times \text{£}400) - (\$1.60/\text{£} \times \text{£}100) = \$460$$
4. B All pure income statement and balance sheet ratios are unaffected by the application of the current rate method. What we mean by "pure" is that the components of the ratio all come from the balance sheet, or the components of the ratio all come from the income statement. Return on assets is a "mixed ratio" because assets come from the balance sheet and are translated at the current rate and net income is translated at the average rate. Unless the exchange rate doesn't change during the year, the two inputs will be translated at different rates, and the local currency value of the ratio will change when translated into the reporting currency. The other ratios will *always* be the same using the current rate method.
5. C As a multinational firm, the location of Mazeppa's head office would most likely determine the currency to be used to prepare its final, consolidated financial statements. Since Mazeppa's is located in Canada, the presentation currency is likely the Canadian dollar. Based on the facts, the local currency is the euro and the functional currency is the U.S. dollar.
6. A This is an indirect quotation from the perspective of the U.S. firm. Since the peso depreciated from the sale date to the end of 2007, a loss is recognized in 2007. However, the peso appreciated from the end of 2007 to the payment date on January 20, 2008. Thus, a gain is recognized in 2008.
7. A The current rate method will result in higher gross profit in a depreciating environment. Under the temporal method, the subsidiary's COGS will be remeasured at the historical rate. This means that COGS will not be affected by the depreciating currency. Sales, however, will be affected by the depreciating currency. Thus, gross profit margin will be lower. Under the current rate method, both sales and COGS will be affected by the depreciating currency.
8. C Subsidiaries whose operations are well integrated with the parent will generally use the parent's currency as the functional currency. Remeasurement from the local currency to the functional currency is done with the temporal method.
9. A In an inflationary environment, the temporal method is required under U.S. GAAP, even if the functional currency and the parent's presentation currency differ. Under the temporal method, inventory, fixed assets, and intangible assets are remeasured at the historical rate; that is, the actual rate when the assets were purchased.



10. **B** If the functional currency is the same as the parent's presentation currency, the temporal method is used. Under the temporal method, the subsidiary's net monetary asset or net monetary liability position is exposed to changing exchange rates.
11. **B** Nonmonetary items are not exposed to purchasing power gains or losses during inflation. Monetary assets will result in purchasing power losses, and monetary liabilities will result in purchasing power gains.

## ANSWERS – CHALLENGE PROBLEMS

12. **C** If Vibrant operates independently from FlexCo, the functional currency is the local and the current rate method applies.

The first step is to compute the ending balance of retained earnings of \$555 [ $\$383.3$  beginning retained earnings + (LC400 net income  $\times$   $\$0.4292$ )].

Next, translate assets, liabilities, and common stock. Assets are \$1,340 (LC3350  $\times$  0.4), liabilities are \$700 (LC1,750  $\times$  0.4), and common stock is \$200 (LC400  $\times$  0.5).

Finally, make the accounting equation balance with the CTA of  $-\$115$  ( $\$1,340$  assets  $-$   $\$700$  liabilities  $-$   $\$200$  common stock  $-$   $\$555$  ending retained earnings).

13. **B** It might look like you have to construct the translated financial statements to answer this question, but you actually don't have to if you remember the relationships between the original subsidiary ratios measured in the local currency and the translated ratios measured in U.S. dollars.

Pure income statement ratios like gross profit margin will be the same. The gross profit margin measured in the local currency is LC1,700 gross profit / LC5,500 revenue = 30.9%; the gross margin measured in U.S. dollars must also be 30.9%.

Mixed ratios like ROA will be different. In this case, since the local currency is depreciating, the translated ROA will be greater than the original ROA. This occurs because net income (in the numerator) is translated at the higher average rate, and total assets (in the denominator) will be translated at the lower current rate. ROA measured in the local currency is LC400 net income / LC3,350 total assets = 11.9%. The ROA measured in U.S. dollars must be greater than 11.9%, which means 12.8% is the only possible answer.

If you did go through the process of calculating the translated ratios, you should have arrived at these numbers:

$$\text{translated gross margin} = \frac{1,700 \times 0.4292}{5,500 \times 0.4292} = \frac{\$729.60}{2,360.60} = 30.9\%$$

$$\text{translated ROA} = \frac{400 \times 0.4292}{3,350 \times 0.40} = \frac{\$171.70}{\$1,340} = 12.8\%$$

14. **A** The local currency is depreciating, so the gross profit margin remeasured in U.S. dollars using the temporal method will be lower than the gross profit margin translated into U.S. dollars using the current rate method. This is because COGS will be measured at the higher historical rate under the temporal method and at the lower average rate under the current rate method. With temporal method COGS greater than current rate COGS, temporal method gross margin will be less than current rate method gross margin. Current rate gross margin is the same as in the original currency (from the previous problem), which means the only possible answer is “lower.”
15. **C** Accounts receivable turnover will be the same under both methods. The numerator (sales) is converted at the average rate under both methods. The denominator (accounts receivable) is converted at the current rate under both methods.
16. **B** Gross profit margin and interest coverage are pure income statement ratios that will not change. The quick ratio is a pure balance sheet ratio that will not change. Return on assets is a mixed ratio (income statement item in the numerator and balance sheet item in the denominator), so it will change as long as the average and current exchange rates are different. Given that the dollar is depreciating against the yen, the current and average rates are likely to be different.
- Therefore, Haskell is correct in his analysis of three of the four ratios: gross profit margin, interest coverage, and the quick ratio.
17. **A** None of the situations will result in a gain. When total assets equal total liabilities, the firm is hedged; thus, no gain or loss is recognized as a result of changing exchange rates. The other situations would result in a translation loss.
18. **B** Fixed assets are the only non-monetary assets. Deferred revenue is the only non-monetary liability. Equity is not relevant to this question.
19. **A** Reducing equity and increasing peso liabilities would be most effective in reducing currency risk to the parent. The other options leave the net exposure unchanged, since there is a one-for-one reduction in both monetary assets and monetary liabilities.

# THE LESSONS WE LEARN

Study Session 7

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## EXAM FOCUS

This topic review provides a brief discussion of the lessons learned from recent accounting scandals and how transparency should help keep analysts from repeating past mistakes. Also, accounting for derivatives used for hedging purposes is introduced. Make sure you know where the gains and losses are reported for each type of hedge.

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## WARM-UP: TRANSPARENCY IN FINANCIAL REPORTING

As a result of recent accounting scandals, users of financial information have called for more transparency in financial reporting. When applied to financial reporting, transparency involves disclosures that are understandable and reliable.

Generally accepted accounting principles (GAAP) require a minimum amount of disclosure, and many firms are now choosing to provide even more information than is required. Consequently, the management discussion and analysis section of the financial statements has expanded significantly in recent years.

Even though the quantity of information has increased, it is still necessary for users to evaluate the quality of information. That said, a number of important lessons have been learned from past accounting scandals.

## FIRST LESSON: READ IT ALL

There is more to an annual report than just the financial statements. The financial footnotes and the management discussion and analysis (MD&A) section are where most of the detail and explanations are found.

The footnotes provide information about the firm's accounting principles, estimates, and assumptions, as well as other details. MD&A provides information about the firm's liquidity, capital resources, and results of operations. Also, some firms use this section to voluntarily provide a discussion of their critical accounting policies.

Unfortunately, there are no standards as to the format and readability of the footnotes and MD&A. This is where transparency adds value. When the footnotes and explanations are not understandable, analysts should move to a higher level of alertness.

## SECOND LESSON: BE SKEPTICAL

If the financial results are too good to be true, they probably are. Although there are some exceptions, be skeptical when a firm's earnings are growing faster than the industry and the economy over the long run.

Also, earnings growth is not sustainable in the long run without growth in operating cash flow. Over the short run, earnings growth can be financed with debt; however, the debt markets can quickly dry up, and so will the growth without the support of internally generated cash flow. This was one of the many problems experienced by Enron.

## THIRD LESSON: EVALUATE THE DISCLOSURES

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### LOS 26.a: Distinguish among the various definitions of earnings (e.g., EBITDA, operating earnings, net income, etc.).

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Some disclosures are required in accordance with GAAP, while other disclosures are related to pro-forma information.

Disclosures often refer to the firm's earnings or the components of earnings. In accounting jargon, the terms *earnings* and *net income* are often used synonymously. However, the terms are not necessarily the same. Thus, it is critical to understand the firm's definition of earnings.

Recall from Level 1 that a multi-step income statement includes subtotals. Each subtotal can be considered a measure of earnings. Following are some common earnings measures.

- **Earnings before interest, taxes, depreciation, and amortization (EBITDA).** EBITDA is often used as a proxy for operating cash flow, although it is still an earnings based measure. EBITDA does not consider the changes in operating accounts on the balance sheet and is subject to the many estimates and judgements involved with accrual accounting.
- **Operating earnings or earnings before interest and taxes (EBIT).** EBIT is often referred to as operating income, or operating profit. It excludes the effects of financing and taxes.
- **Income from continuing operations.** This subtotal is equal to the firm's earnings before any "below the line" items are considered. Recall from Level 1 that discontinued operations and extraordinary items are reported "below the line," net of tax. Without any "below the line" items, income from continuing operations and net income would be the same.



*Professor's Note: The cumulative effect of a change in accounting principle is no longer reported "below the line" in the income statement. A change in accounting principle is now reported retrospectively in accordance with SFAS No. 154, "Accounting Changes and Error Corrections." Accordingly, all of the prior period financial statements presented are restated to reflect the change.*

**Net income.** Net income is the bottom line of the income statement. Net income includes all revenues, expenses, gains, losses, and *below the line* items.

In pro-forma disclosures, some firms have created their own measures of income (usually called pro-forma earnings) whereby they strip away certain nonoperating and nonrecurring transactions. For example, a firm might remove a restructuring charge from pro-forma earnings, treating the charge as nonrecurring. In some firms, however, restructuring charges seem to continue to occur every few years. Therefore, it is necessary to examine the footnotes and other disclosures in order to evaluate whether these transactions should be removed for analytical purposes.

#### FOURTH LESSON: CHECK FOR CASH FLOW

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**LOS 26.b: Illustrate how trends in cash flow from operations can be more reliable than trends in earnings.**

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Operating cash flow is generally more reliable than earnings because it is less subject to estimates and judgements. However, over time there should be a fairly stable relationship between the growth of operating cash flow and earnings. If not, the firm may be engaging in earnings manipulation. Also, earnings growth is not sustainable without the support of operating cash flow over the long run.

In the case of Enron, there were wide differences in operating cash flow and operating income. Operating cash flow was often negative while operating income was positive. Also, earnings growth significantly exceeded the growth in operating cash flow.

#### FIFTH LESSON: UNDERSTAND THE RISKS

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**LOS 26.c: Provide a simplified description of the accounting treatment for derivatives being used to hedge: exposure to changes in the value of assets and liabilities, exposure to variable cash flow, and a foreign currency exposure of an instrument in a foreign corporation.**

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Firms face a multitude of business and financial risks. Analysts must be able to identify the risks and understand how the firm manages the risks. Of course, not all firms face the same risks, but some of the more common risks include:

- Interest rate risk.
- Foreign exchange risk.
- Accounts receivable risk.
- Price risk of raw materials and other inputs.

Firms often use derivatives to manage these risks. Generally, these transactions involve some type of hedge whereby the firm will use the fair values or cash flows from derivative instruments to offset the changes in fair values or cash flows of the at-risk assets or liabilities.

Derivatives are reported on the balance sheet at fair value. If the firm is using a derivative to speculate, all gains and losses (both realized and unrealized) from the derivative are recognized in the income statement. If the derivative is used for hedging purposes, gain or loss recognition depends on the type of hedge (fair value, cash flow, and net investment of a foreign subsidiary).

- **Fair value hedge.** In a fair value hedge, the firm uses derivatives to hedge exposure to changes in the fair value of recognized assets or liabilities. For example, a firm might use a put option to hedge an equity investment. If perfectly hedged, the gain or loss on the derivative will exactly offset the gain or loss of the hedged asset or liability. The firm reports both the derivative and the hedged asset or liability on the balance sheet at fair value. In addition, the unrealized gains and losses from the derivative and from the hedged asset or liability are recognized in the income statement.
- **Cash flow hedge.** In a cash flow hedge, the firm uses derivatives to hedge exposure to variable cash flows. For example, a firm might use a forward contract to hedge the future cash flows of an anticipated transaction. Like a fair value hedge, the firm reports the derivative instrument at fair value on the balance sheet. However, the unrealized gains and losses from the derivative bypass the income statement and are reported in shareholders' equity as a part of other comprehensive income. The accumulated gains and losses are eventually recognized in the income statement when the anticipated transaction affects earnings.
- **Net investment hedge of a foreign subsidiary.** A firm with a foreign subsidiary may enter into foreign exchange contracts and other transactions in order to offset the effects of fluctuating foreign currency on its net investment in the subsidiary. The gains and losses from the foreign currency transactions bypass the income statement and are reported in shareholders' equity as a part of other comprehensive income. This treatment offsets the gain or loss recognition in equity from translating the financial statements of the foreign subsidiary using the current rate method.



*Professor's Note: If the foreign subsidiary's financial statements are remeasured using the temporal method, the gains and losses from the hedge are recognized in the income statement along with the remeasurement gains and losses. The current rate method and the temporal method are covered in the topic review on the analysis of multinational operations in Study Session 6.*

The three types of hedges are summarized in Figure 1.

**Figure 1: Summary of Hedge Types**

	<i>Purpose</i>	<i>Recognition</i>
Fair value hedge	Offset exposure to changes in fair value of an asset or liability.	Gains and losses are recognized in the income statement.
Cash flow hedge	Offset exposure to variable cash flows from anticipated transactions.	Gains and losses are reported in equity. The gains and losses are eventually recognized in the income statement once the anticipated transaction affects earnings.
Net investment hedge of a foreign subsidiary	Offset exposure from an existing investment in a foreign subsidiary.	Gains and losses are recognized in equity along with translation gains and losses.

An effective hedge is one in which the change in fair value, cash flow, or net investment is exactly offset by changes in the hedging instrument. If the change in the hedging instrument is more or less than the change in value, cash flow, or net investment, the *extra* change is referred to as the portion of the hedge that is not effective.

In all three hedge types, any portion of the hedge that is not effective is recognized in the income statement.

## KEY CONCEPTS

### LOS 26.a

It is critical to understand the firm's definition of earnings:

- EBITDA is not an appropriate proxy for cash flow.
- Operating earnings are also referred to as EBIT, operating income, and operating profit.
- Income from continuing operations is earnings before extraordinary and nonrecurring items.

It is necessary to examine the footnotes and other disclosures in order to evaluate whether nonoperating and nonrecurring transactions should be removed for analytical purposes.

### LOS 26.b

Over time, there should be a fairly stable relationship between the growth of operating cash flow and earnings. Earnings growth is not sustainable without the support of operating cash flow growth over the long run.

### LOS 26.c

Firms often use derivatives to manage risk.

In a fair value hedge, the gains and losses from the derivative and from the hedged asset or liability are recognized in the income statement.

In a cash flow hedge, the gains and losses from the derivative bypass the income statement and are reported in shareholders' equity.

In a net investment hedge of a foreign subsidiary, the gains and losses are recognized in equity along with the translation gains and losses.



## CONCEPT CHECKERS

- Which of the following statements about earnings before interest, taxes, depreciation, and amortization (EBITDA) is *least accurate*?
  - It is sometimes used as a proxy for operating cash flow.
  - It is calculated without regard to working capital changes on the balance sheet.
  - It is based on the cash basis of accounting.
- BHG Corporation provides goods and services to its customers on credit. Customer payments are due 30 days from invoice date. Ignoring taxes, what is the *likely* impact on net income and operating cash flow if BHG recognizes revenue too soon?
 

<u>Net income</u>	<u>Operating cash flow</u>
A. Higher	No effect
B. Higher	Higher
C. No effect	No effect

## CHALLENGE PROBLEMS

- At the beginning of this year, KSG Company issued a \$10 million, 8% coupon bond maturing in five years. KSG is concerned that if interest rates decrease, the fair value of its liability will increase. Consequently, KSG enters into an interest rate swap whereby it will receive payments at a fixed rate and make payments at a floating rate. KSG designates the swap as a fair value hedge. If interest rates decline at the end of the year, is the holding gain from the swap recognized in net income and other comprehensive income?
  - Net income only.
  - Other comprehensive income only.
  - Neither income account is affected because unrealized holding gains are not recognized.
- RGH Corporation is a coffee distributor. Next year, RGH anticipates purchasing 100 tons of coffee beans. Concerned that coffee bean prices will increase next year, RGH immediately purchases a futures contract and designates the contract as a cash flow hedge. At the end of this year, the price of coffee beans is higher than the contract purchase date. Next year, when the contract is settled, the price of coffee beans has increased even more. If all of the coffee beans are consumed next year, where in the financial statements are the gains on the futures contract recognized this year and next year?
 

<u>This year</u>	<u>Next year</u>
A. Net income	Other comprehensive income
B. Other comprehensive income	Net income
C. Other comprehensive income	Other comprehensive income

5. Frankfurt Company, located in Germany, is a wholly owned subsidiary of New York Company. New York uses the current rate method to translate the financial statements of Frankfurt into U.S. dollars. New York wants to hedge its net asset position in Frankfurt by issuing euro denominated bonds. If the hedge is effective, would a gain on the bond hedge be recognized in New York's income statement and as a direct adjustment to New York's equity?

	<u>Income statement</u>	<u>Direct adjustment to equity</u>
A. Yes		No
B. No		Yes
C. No		No

## ANSWERS – CONCEPT CHECKERS

1. C EBITDA is a measure of earnings that is based on the accrual method of accounting. The other choices are correct.
2. A Recognizing revenue too soon will result in higher net income. Operating cash flow is only affected when payments are received. Net income will increase by the amount of the revenue increase (because we're ignoring the income tax impact), but accounts receivable will increase by the same amount. Operating cash flow is equal to net income plus noncash charges minus increases in working capital, so the two effects will offset each other and operating cash flow won't change.

## ANSWERS – CHALLENGE PROBLEMS

3. A Because the swap was designated as a fair value hedge, the holding gain on the swap is recognized in net income. Other comprehensive income is not affected.
4. B Because the futures contract is designated as a cash flow hedge, the unrealized gain at the end of this year is reported in shareholders' equity as a component of other comprehensive income. All of the gains from the futures contract are recognized in net income next year when the coffee beans are consumed.
5. B Because New York uses the current rate method to translate the financial statements of Frankfurt, the gains and losses from effective foreign currency hedges bypass the income statement and are reported in shareholders' equity as a part of other comprehensive income.

# EVALUATING FINANCIAL REPORTING QUALITY

Study Session 7

## EXAM FOCUS

Earnings quality has been an important part of the Level 2 curriculum for years. The focus is on measuring earnings quality by comparing the differences in the cash basis of accounting and the accrual basis. You must be familiar with the numerous techniques that firms can use to manipulate earnings. Also, you should be able to measure earnings quality quantitatively.

### LOS 27.a: Contrast cash-basis and accrual-basis accounting and explain why accounting discretion exists in an accrual accounting system.

With the **cash basis of accounting**, revenues are recognized when cash is collected and expenses are recognized when cash is paid. However, the cash flows may occur in different periods than when the revenues are actually earned or when the expenses are actually incurred. For example, the purchase of equipment used in a firm's manufacturing operation may result in an immediate cash outflow, but the equipment generates revenues over its useful life. In this case, the revenues and associated expenses are reported in different periods.

With the **accrual basis of accounting**, revenues are recognized when earned, and expenses are recognized when incurred, regardless of the timing of cash flow. Back to our equipment purchase, the cost of the equipment will be allocated to the income statement over the asset's life and contemporaneously matched with the revenues generated.

Let's look at an example of both accounting methods.

#### Example: Cash basis vs. accrual basis of accounting

Let's assume that on May 31 of this year, you decided to establish a lawn service company, and you contributed \$150 cash to get started. Your dad has an old push mower in the garage that you agree to lease for a one-time payment of \$50 due on August 1. During the month of June, you mow 4 lawns for \$30 each. At the end of the month, you invoice your customers and payment is received 15 days later.

Prepare the income statement and balance sheet at the end of June, July, and August assuming the cash basis and the accrual basis of accounting.

**Answer:**

Following are the results using the cash basis of accounting.

<i>Cash Basis</i>	<i>June</i>	<i>July</i>	<i>August</i>
<i>Income Statement</i>			
Revenue	\$0	\$120	\$0
Expense	<u>0</u>	<u>0</u>	<u>(50)</u>
Net income (loss)	\$0	\$120	(\$50)
<i>Balance Sheet</i>			
Assets (Cash)	\$150	\$270	\$220
Equity	\$150	\$270	\$220

In evaluating your performance, an analyst's conclusions would change month-to-month. You reported no profit in June even though you provided services to your customers. Your net income of \$120 in July looks promising. However, in August, you reported a \$50 loss. Under the cash basis, we must wait until the end of August before we have a clear picture of the events even though the results were known with reasonable certainty at end of June.

Now let's look at the results using the accrual basis of accounting.

<i>Accrual Basis</i>	<i>June</i>	<i>July</i>	<i>August</i>
<i>Income Statement</i>			
Revenue	\$120	\$0	\$0
Expense	<u>(50)</u>	<u>0</u>	<u>0</u>
Net income	\$70	\$0	\$0
<i>Balance Sheet</i>			
Cash	\$150	\$270	\$220
Receivables	<u>120</u>	<u>0</u>	<u>0</u>
Total assets	\$270	\$270	\$220
Lease liability	\$50	\$50	\$0
Equity	<u>220</u>	<u>220</u>	<u>220</u>
Liabilities & equity	\$270	\$270	\$220

Using the accrual basis, all of the revenues and expenses are recognized in June because that is when the main business activities were completed. All that remains in July and August are the incidental transactions of collecting from customers and paying creditors. In this case, we can use the receivables and payables to forecast future cash flow.

Users of financial information seek timely information about future cash flows. The accrual basis of accounting provides this information at the earliest appearance of objective evidence. Thus, *accrual accounting provides more timely and relevant information to users.*

Unfortunately, accrual accounting necessitates the use of discretion because of the many estimates and judgments involved with assigning revenue and expense to the appropriate periods. Many of these estimates are subjective and can be “strategically” manipulated by management to achieve a desired result. For example, net income is often the basis of executive compensation. Thus, management may have an incentive to manipulate the estimates strategically for their own gain.

Some of the more common estimates involve:

- Revenue recognition including the timing of revenue recognition, bad debt expense, warranty expense, and returns and allowances.
- Depreciation estimates such as useful lives and salvages values. Firms also have choices of different depreciation methods (e.g., straight-line, accelerated).
- Inventory cost flow assumptions (e.g., LIFO, FIFO, average cost) and obsolescence issues.
- Forecasting cash flows in order to test for impaired assets such as plant and equipment and goodwill.
- Valuation allowances for deferred tax assets.
- Pension assumptions such as the discount rate, compensation growth rate, and expected rate of return.
- Stock option valuation models used to compute compensation expense.

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**LOS 27.b: Describe the relation between the level of accruals and the persistence of earnings and the relative multiples that the cash and accrual components of earnings should rationally receive in valuation.**

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We will use the term *accruals* to describe the differences in the cash basis and accrual basis of accounting. The differences are the result of unearned revenue, accrued revenue, deferred expense, and accrued expense.

*Unearned (deferred) revenue* occurs when payment is received in advance of providing goods or services. Unearned revenue is reported as a liability on the balance sheet. Once the revenue is earned, the liability decreases. For example, a magazine subscription is usually paid in advance. When received, the publisher increases its cash and records a liability for its obligation to deliver. Once delivery occurs, revenue is recognized and the liability decreases.

*Accrued revenue* occurs when revenue has been earned but it has not yet been collected. For example, when a firm sells goods “on account,” profit is recognized in the income statement. In the balance sheet, inventory decreases by its cost, and receivables increase by the sale amount. When the receivable is collected, there is an increase in cash and a decrease in receivables.

*Deferred expenses* are costs that will benefit future periods. These costs usually involve noncurrent assets and prepaid assets. For example, a tenant must usually pay his rent in advance. The result is a decrease in the tenant’s cash and an increase in a prepaid asset. Once the rent expires, expense is recognized and the asset decreases.

*Accrued expenses* are expenses that have been incurred but not yet paid. For example, a firm may recognize wage expense in one period but actually pay the wages in a later period. In this case, when the expense is recognized in the income statement, a liability is increased. When the wages are paid, liabilities decrease, as does the firm’s cash.

Extensive research has shown that income prepared using accrual accounting enhances the predictive ability of cash flows. However, because of the numerous estimates involved with revenue and expense recognition, disaggregating income into its major components further enhances its predictive ability. The accrual component of income (accruals) is less persistent than the cash component. By persistent we mean the income is sustainable; that is, a dollar of earnings today implies a dollar of earnings in future periods. Lower persistency is partially due to the estimates involved with accrual accounting. Thus, an analyst would apply a lower weighting to the accrual component of income than the cash component when evaluating company performance.

Lower persistency is not always the result of strategic manipulation. Estimate errors can also occur unintentionally. For example, firms estimate bad debt expense for uncollected receivables. However, unforeseen circumstances may affect eventual collections.

It is difficult to determine if an estimate error is unintentional or strategic, but the ultimate result is the same. If earnings are overstated, then future cash flows will be lower. In either case, if an investor fails to assign a lower weighting to the accrual component of the earnings, securities become mispriced.

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**LOS 27.c: Discuss the opportunities and motivations for management to intervene in the external financial reporting process and the mechanisms that discipline such intervention.**

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Firms may engage in manipulative behavior in order to influence capital markets and to satisfy contractual provisions.

## Capital Markets

Security prices are affected as the capital markets digest reported financial information. Thus, there is an incentive for firms to meet or exceed the market’s expectations.

Studies have shown that more firms report small profits as compared to firms that report small losses. This outcome may partially be the result of strategic manipulation. In addition, studies have shown that more firms report earnings that slightly exceed analyst (sell-side) forecasts as compared to firms that just miss the forecasts. This could also be the result of manipulation or possibly managing the earnings expectations of analysts; that is, encouraging analysts to assume slightly lower forecasts.

The difference in a firm's reported earnings and the consensus sell-side earnings forecast is known as *forecast error*. The consensus sell-side forecast is a benchmark the firm is trying to meet. Firms periodically communicate their earnings expectations to the market in order to move the benchmark.

For example, suppose that early in the fiscal year, analyst forecasts tend to be higher than what the firm ends up reporting; that is, the forecasts tend to be optimistic. Later in the year, analyst forecasts tend to be lower than what the firm ends up reporting; that is, the forecasts tend to be pessimistic. The result is a positive earnings surprise when the firm's earnings are finally announced.

### Contractual Provisions

There are numerous contracts that are based on accounting data. For example, lending covenants are often used to maintain the risk profile of the debt. Lenders want protection from actions of the borrower that would negatively affect their claims to the borrower's assets and earnings. If the borrower is not in compliance with the debt covenants, the lender can immediately demand repayment. Thus, firms have an incentive to remain in compliance with the covenants.

Another popular contract involving accounting data is an executive compensation plan. As previously discussed, management may engage in manipulative behavior for their own gain.

### MECHANISMS TO DETER STRATEGIC MANIPULATION

There are a number of mechanisms designed to prevent strategic manipulation such as:

- *An independent audit.* The auditor expresses an opinion as to whether the financial statements conform to GAAP, the estimates are reasonable, and the data includes no material errors. The auditor also examines the firm's internal control system and reports any weaknesses to the audit committee of the board of directors.
- *The board of directors.* Through the audit committee and the firm's internal auditors, the board can discourage unwanted behavior.
- *Certification by senior management.* In the United States, the CEO and CFO must certify the financial statements, which increases their personal risk.
- *Class action litigation.* Lawsuits serve as a deterrent to manipulating results.
- *Regulators.* Regulators can use fines as well as criminal prosecution as a deterrent.
- *General market scrutiny.* Business journalists, financial analysts, short sellers, and unions are constantly trying to identify manipulative behavior.



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**LOS 27.d: Discuss earnings quality and the measures of earnings quality, and compare and contrast the earnings quality of peer companies.**


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The term *earnings quality* usually refers to the persistence and sustainability of a firm's earnings; that is, more persistent and sustainable earnings are considered higher quality. Some analysts wrongly define earnings quality in terms of the degree of conservatism of earnings. For example, firms that use the accelerated depreciation method, as compared to the straight-line method, would report conservative (lower) and, thus, supposedly higher quality earnings.

Measuring earnings quality based on conservative earnings is an inferior measure when attempting to forecast future earnings because most accruals will self-correct over time. For example, the lower earnings that result from accelerated depreciation will increase in the later years of the asset's life. Focusing on accruals and deferrals is a more effective way of measuring earnings quality.

### Measuring Earnings Quality

Recall that earnings have a cash flow component and an accrual component. By measuring the difference in cash flow and earnings, we can capture the accrual component.

We can disaggregate reported earnings into cash flow and accruals using a balance sheet approach or a cash flow statement approach. It is often difficult to identify the specific account that has been manipulated; thus, we will focus on the aggregate accruals.

*Balance sheet approach.* Using the balance sheet, we can measure accruals as the change in net operating assets over a period. Net operating assets (NOA) is the difference in operating assets and operating liabilities. Operating assets are equal to total assets minus cash, equivalents to cash, and marketable securities. Operating liabilities are equal to total liabilities minus total debt (both short-term and long-term). In summary, the formula for balance sheet based aggregate accruals is:

$$\text{accruals}^{\text{BS}} = \text{NOA}_{\text{END}} - \text{NOA}_{\text{BEG}}$$

In order to make comparisons, it is necessary to scale the accrual measure for differences in size. Just like ROA and ROE, the measure can be distorted if a firm is growing or contracting quickly. Scaling the measure also allows for comparisons with other firms. Scaling is done by dividing the accrual measure by the average NOA for the period. The result is known as the accruals ratio:

$$\text{accruals ratio}^{\text{BS}} = \frac{(\text{NOA}_{\text{END}} - \text{NOA}_{\text{BEG}})}{(\text{NOA}_{\text{END}} + \text{NOA}_{\text{BEG}}) / 2}$$

*Cash flow statement approach.* We can also derive the aggregate accruals by subtracting cash flow from operating activities (CFO) and cash flow from investing activities (CFI) from reported earnings as follows:

$$\text{accruals}^{\text{CF}} = \text{NI} - \text{CFO} - \text{CFI}$$

Recall from Level 1 that IFRS allows some flexibility in the classifications of certain cash flows, primarily interest and dividends paid. Thus, for firms following U.S. GAAP, it may be necessary to reclassify these cash flows from operating activities to financing activities for comparison purposes.

Like the balance sheet accrual measure, the cash flow measure must be scaled for comparison purposes. Thus, the accruals ratio based on the cash flow statement follows:

$$\text{accruals ratio}^{\text{CF}} = \frac{(\text{NI} - \text{CFO} - \text{CFI})}{(\text{NOA}_{\text{END}} + \text{NOA}_{\text{BEG}}) / 2}$$

The interpretation of both accruals ratios is the same; the lower the ratio, the higher the earnings quality.



*Professor's Note: Both accruals ratios (from the balance sheet and cash flow statement) are conceptually equivalent; however, in practice, their results may differ because of acquisitions and divestitures, exchange rate gains and losses, and inconsistent treatment across the balance sheet and the cash flow statement.*

Let's look at an example.

**Example: Calculating accruals using the balance sheet approach and the cash flow statement approach**

**Part A.** Calculate the accruals ratio for 2009 using the following balance sheet.

Balance Sheet As of December 31		
	2009	2008
<i>Assets</i>		
Cash	€4,400	€4,000
Accounts receivable	7,000	6,000
Inventory	8,400	8,000
Fixed assets, net	<u>27,600</u>	<u>26,000</u>
Total assets	€47,400	€44,000
<i>Liabilities and Equity</i>		
Accounts payable	€3,520	€3,200
Short-term notes payable	5,288	4,800
Long-term debt	<u>30,000</u>	<u>30,000</u>
Total liabilities	€38,808	€38,000
Common stock	4,600	4,000
Retained earnings	<u>3,992</u>	<u>2,000</u>
Total liabilities and equity	€47,400	€44,000

**Answer Part A:**

The first step is to compute the beginning and ending balances of NOA.

	2009	2008
Total assets	€47,400	€44,000
Cash	<u>(4,400)</u>	<u>(4,000)</u>
Operating assets	€43,000	€40,000
Total liabilities	€38,808	€38,000
Short-term notes payable	(5,288)	(4,800)
Long-term debt	<u>(30,000)</u>	<u>(30,000)</u>
Operating liabilities	€3,520	€3,200
Net operating assets	€39,480	€36,800

Next, calculate the average NOA for 2009 of:

$$€38,140 = (€39,480 \text{ NOA}_{\text{END}} + €36,800 \text{ NOA}_{\text{BEG}}) / 2$$

Finally, calculate the accruals ratio for 2009:

$$(€39,480 \text{ NOA}_{\text{END}} - €36,800 \text{ NOA}_{\text{BEG}}) / 38,140 \text{ NOA}_{\text{AVG}} = 7.03\%$$

**Part B.** Calculate the accruals ratio using the following income statement and cash flow statement.

Income Statement Year Ended December 31, 2009	
Sales	€38,000
Cost of goods sold	(24,000)
Depreciation expense	(3,000)
SG&A expense	(2,000)
Interest expense	(2,400)
Taxes	<u>(2,880)</u>
Net income	€3,720

**Cash Flow Statement**  
**Year Ended December 31, 2009**

Cash from operations	€5,640
Cash from investing	(4,600)
Cash from financing	<u>(640)</u>
Change in cash	€400

**Answer Part B:**

First, calculate the aggregate accruals as follows:

Net income	€3,720
Cash from operations	(5,640)
Cash from investing*	<u>4,600</u>
Accruals	€2,680



*\*Professor's Note: We are subtracting cash flow from investing from net income; however, cash from investing is a negative number. Subtracting a negative number requires addition.*

Next, using the average NOA from Part A, calculate the accruals ratio for 2009:

$$€2,680 \text{ accruals} / 38,140 \text{ NOA}_{\text{AVG}} = 7.03\%$$

**Part C.** Using the information in the following table (unrelated to Part A and Part B), discuss the earnings quality of Red Company and Blue Company.

<i>Accrual Ratio</i>	<i>2009</i>	<i>2008</i>
Red	12.4%	17.8%
Blue	9.5%	6.9%

**Answer Part C:**

Blue's earnings quality is higher because its accrual ratio is lower in both years. However, Red's earnings quality is improving while Blue's is deteriorating.

**LOS 27.e: Explain mean reversion in earnings and how the accruals component of earnings affects the speed of mean reversion.**

When examining net income, analysts should be aware that earnings at extreme levels tend to revert back to normal levels over time. This phenomenon is known as mean reversion and can be explained with basic economics. The competitive marketplace corrects poor performance; thus, losses are eliminated as firms abandon negative

value projects. Conversely, capital is attracted to successful projects thereby increasing competition and lowering returns.

Because of mean reversion, analysts must understand that extreme earnings (high or low) should not be expected to continue indefinitely.

Earlier, we learned that earnings consist of cash flow and accruals, and there is an inverse relationship in accruals and future cash flow. When earnings are largely comprised of accruals, mean reversion will occur even faster.

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**LOS 27.f: Discuss problems with the quality of financial reporting, including revenue recognition, expense recognition, balance sheet issues, and cash flow statement issues, and interpret warning signs of these potential problems.**

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Relevant financial reporting measures vary across firms. For example, depreciation methods and assumptions are relevant for capital intensive firms and inventory measures are relevant to retailing and manufacturing firms. Financial reporting measures also vary across time, making it easier to hide manipulation when a firm is growing. As a result, financial reporting measures should include year-over-year comparisons as well as comparisons with the firm's sector (industry) group.

Subtracting the mean or median sector group ratio from the target firm's is called *sector neutralizing*. Sector neutralizing is a useful tool in examining earnings quality but comparability may be limited because of a lack of homogeneity (firms may have divisions operating in different industries) and because firms change over time through acquisitions and divestitures.

## DISCRETION IN REVENUE RECOGNITION

Much discretion is involved with recognizing revenue. Manipulation techniques include misstating revenue, accelerating revenue, and misclassifying nonrecurring or nonoperating revenue.

### Misstating Revenue

With accrual accounting, revenue is recognized when realized and earned. Revenue is realized when the seller can measure the amount of cash, or other assets, it ultimately will receive. Revenue is earned when the seller no longer has an obligation to provide goods or services. Because of these requirements, recognizing revenue involves a number of estimates including bad debt expense, warranty expense, and sales returns and allowances.

In addition, judgment is involved when recognizing unearned (deferred) revenue. As previously discussed, unearned revenue is payment received for goods or services that have yet to be provided. Unearned revenue is reported as a liability on the balance sheet. When the goods or services have been provided, revenue is recognized in the income statement and the liability decreases. This allows firms to “store-up” future revenues. For

example, unearned revenue usually increases during periods of growth. Once growth subsides, firms can recognize the deferred revenue and, thus, report higher earnings.

### **Accelerating Revenue**

As discussed, firms must wait to recognize revenue until it is earned; that is, when the firm no longer has an obligation to provide goods and services. It is sometimes difficult to tell when a firm no longer has an obligation to perform. For example, consider a firm that bundles goods and services together, like a firm that sells a product along with a multi-period service agreement. Revenue from the service agreement should be deferred until the service has been provided. However, determining the amount attributed to the sale and the service agreement involves judgment. Any time judgment is involved, there is an opportunity to manipulate.

### **Misclassifying Nonrecurring or Nonoperating Revenue**

Investors typically focus more on operating income than nonrecurring and nonoperating income. Thus, firms may have an incentive to misclassify transactions as a part of normal operations. For example, a firm might sell a noncurrent asset and include the gain as a part of operating income.

Nonrecurring and nonoperating revenue do not typically self-correct like deferrals and accruals thereby providing an even greater manipulation benefit to the firm.

## **EXPENSE RECOGNITION**

Like revenues, much discretion is involved with recognizing expenses. Manipulation techniques include understating expenses, delaying expenses, and misclassifying ordinary expenses as nonrecurring or nonoperating.

### **Understating Expenses**

Here, the focus is on the allocation of capitalized costs, primarily costs associated with fixed assets and inventory. Recall from Level 1, the cost allocation of fixed assets to the income statement is known as depreciation. Depreciation expense is affected by the decision of which costs to capitalize, the specific method used (e.g., straight-line, accelerated), and estimates of useful life and salvage (residual) value. By increasing either or both of the estimates, firms will report less depreciation expense and, thus, higher earnings.

The cost allocation of inventory is known as cost of goods sold (COGS). Like fixed assets, there is some discretion of which costs to capitalize. In addition, in order to calculate COGS, it is necessary to value the inventory at year-end. Finally, inventory must be tested for obsolescence using the lower-of-cost-or-market method. Obsolete inventory must be written down in the income statement which results in lower earnings. Thus, failure to recognize obsolescence overstates earnings.

## Delaying Expenses

Delaying expenses involves deferring recognition to a future period. Delaying expense is the result of capitalizing a cost instead of immediately recognizing the cost in the income statement. The result is higher profit in the current period. Improperly capitalized costs usually involve noncurrent assets such as plant and equipment and intangible assets.

## Misclassifying Operating Expenses as Nonrecurring or Nonoperating

As previously discussed, investors typically focus more on operating income than nonrecurring and nonoperating income. Thus, firms may have an incentive to increase operating income by misclassifying an operating expense as a nonrecurring or nonoperating item.

For example, a firm might understate depreciation expense by assuming longer useful lives and/or higher salvage values for its fixed assets. If too little depreciation is recognized, an impairment will eventually occur and a loss will be recognized in the income statement. If the firm reports this loss as a nonrecurring item, investors may discount the loss in their earnings forecasts. If so, the firm has successfully reclassified an operating expense as nonrecurring and increased its operating profit. Said another way, had the firm recognized sufficient depreciation expense, an impairment would not have been necessary. Of course, higher depreciation expense would have resulted in lower operating income.

## BALANCE SHEET

Because of the relationship between the balance sheet and the income statement, how items are treated on the balance sheet can affect earnings quality. Specifically, we will examine the effects of off-balance-sheet financing and goodwill.

## Off-Balance-Sheet Financing

There are numerous contractual obligations that are not reported on the balance sheet as liabilities. The most popular off-balance-sheet financing technique, by far, is an operating lease.

A lease is a contractual arrangement whereby the *lessor*, the owner of the asset, allows the *lessee* to use the asset for a specified period of time. A lease can be treated as a capital lease or an operating lease.



*Professor's Note: Capital leases are known as finance leases under IFRS.*



A capital lease transfers substantially all of the risks and rewards of ownership to the lessee. According to U.S. GAAP, if any one of the following is met at inception, the lessee must capitalize the lease:

- Ownership of the leased asset is transferred to the lessee at the end of the lease.
- The lease contains a bargain purchase option.
- The lease term is 75% or more of the asset's economic life.
- The present value of the lease payments is 90% or more than the fair value of the leased asset.

With a capital lease, the lessee treats the lease as an asset purchase assuming debt financing. Accordingly, the asset is depreciated and interest expense is recognized on the liability. Thus, capital lease treatment affects the lessee's leverage and profitability.

An operating lease does not meet any of the listed criteria. With an operating lease, neither an asset nor a liability is reported by the lessee. Rather, during the term of the lease, *rent expense*, equal to the lease payment, is recognized in the lessee's income statement. Thus, firms have an incentive to structure the lease as an operating lease to obtain more favorable balance sheet treatment.

## Goodwill

Firms that are involved in acquisitions can report significant amounts of goodwill on the balance sheet. As discussed in the topic review on intercorporate investments, goodwill is the excess of purchase price over the fair value of the identifiable assets and liabilities acquired in a business combination.

Goodwill is not amortized. Instead, it is tested for impairment at least annually or more often if circumstances warrant. Impairment occurs when the carrying value exceeds the fair value. However, measuring the fair value of goodwill is complicated by the fact that goodwill cannot be separated from the business. Thus, there is much judgment involved in determining whether goodwill is impaired. Of course, recognizing an impairment results in a loss.

## CASH FLOW STATEMENT

As we have discussed, net income is easily manipulated because of accrual accounting and the many estimates involved. On the other hand, cash flow is unaffected by estimates. However, firms can still manipulate the cash flow statement by misclassifying cash flows, ignoring cash flows, and managing cash flows.

### Misclassifying Cash Flow

Firms can misrepresent their cash-generating ability by classifying investing activities as operating activities and vice versa.

For example, under U.S. GAAP, the cash flow statement reconciles the changes in cash and cash equivalents. Cash equivalents include short-term, highly liquid investments. Some firms "park" cash in longer-term investments such as marketable debt and equity

securities. Typically, the acquisition and disposal cash flows from these longer-term investments are reported as investing activities in the cash flow statement.

### Ignoring Cash Flow

Noncash investing and financing activities are not reported in the cash flow statement since they do not result in an inflow or outflow of cash. For example, a capital lease is both an investing and financing decision in that the transaction is the equivalent of borrowing the purchase price. However, since no cash is involved, the transaction has no net impact on the cash flow statement at the inception of the lease.

Operating leases also suffer from a lack of cash flow recognition at inception.

The accrual amounts are also affected by acquisitions. Under the purchase method, the price paid is reported as an investing activity in the cash flow statement, and the method of financing is reported as a financing activity. In return for the price paid, the investor reports the individual assets and liabilities of the acquired firm. Since the acquired assets and liabilities were not included on the investor's balance sheet at the beginning of the period, analysts must be careful when computing the changes in accruals.

### Managing Cash Flow

Most of our discussion has centered on the estimates involved with accrual accounting. There are no estimates involved when an expenditure is expensed immediately in the income statement. However, the firm can still manipulate earnings by delaying or accelerating the expenditure to a different period. For example, under U.S. GAAP, research and development costs are generally expensed as incurred. In order to increase current period earnings, the firm can delay the expenditure until the next period.

## REVENUE RECOGNITION

Manipulation techniques include misstating revenue, accelerating revenue, and misclassifying nonrecurring or nonoperating revenue.

### Detecting Misstating Revenue

Detecting misstated revenue involves focusing on the related balance sheet accounts. Revenue is related to the balance sheet through accounts receivable and unearned revenue. Large changes in these accounts are suspect. When a large portion of revenue is attributed to an increase in receivables or decrease in unearned revenue, the revenue is considered lower quality.

Analysts should also pay attention to ratios such as accounts receivable turnover or days' sales outstanding (DSO). DSO measures the number of days it takes to convert receivables into cash and is calculated by dividing the number of days in the period by accounts receivable turnover. An increasing DSO (decreasing receivables turnover) may be an indication of lower quality revenue; that is, the longer it takes to collect from customers, the more likely the receivables will turn into bad debt.

Analysts must be careful in interpreting a firm's DSO because the measure can vary due to changes in the firm's credit policy. For example, the firm may have intentionally loosened its credit standards in order to increase market share.

In addition, selling (factoring) or securitizing receivables will result in a lower DSO. However, the result is a one-time increase in cash that is not sustainable.

### Detecting Accelerating Revenue

Like misstated revenue, detecting accelerated revenue involves focusing on accounts receivable and unearned revenue. Large changes in these accounts should be investigated.

Another detection technique involves comparing revenue to the actual cash collected from the customer. In order to reconcile revenue with cash collections, we need to adjust revenue for the change in receivables and the change in unearned revenue as follows:

$$\text{cash collections} = \text{revenue} - \text{increase in receivables} + \text{increase in unearned revenue}$$

For example, assume reported revenues are £100. Also, during the period, accounts receivable increased £10 and unearned revenue decreased £5. In this case, cash collections is equal to £85 (£100 revenue – £10 increase in A/R – £5 decrease in unearned revenue).

Normally, the relationship between revenue and cash collections is relatively stable. If not, the firm may be manipulating revenue.

When analyzing revenue, analysts should be on higher alert when:

- Senior management owns a significant number of vested options that are “in the money.”
- The firm is trying to maintain exponential sales growth.
- The firm is attempting to raise additional financing.

### Detecting Misclassifying Nonrecurring or Nonoperating Revenue

To detect improper classification, the analyst should look for inconsistencies in the firm's definition of operating income. For example, the analyst should compare reported income and pro-forma income that are provided each quarter. Excluding certain items from pro-forma earnings may be an indication of revenue misclassification.

Following is a brief discussion of other revenue issues that may impact earnings quality.

*Implementing a “bill and hold” arrangement.* Bill and hold occurs when the seller invoices the customer but does not ship the goods until a later date. Alternatively, the seller may ship the goods to a location other than the customer's. In either case, the seller may be recognizing revenue prematurely.

*Channel stuffing.* Channel stuffing involves pushing more goods into the distribution channel than the channel can sell.

*Use of barter transactions.* In a barter transaction, two parties exchange goods or services. The main issue is whether a sale transaction has actually occurred and whether the transaction amount is overstated.

*Abnormal sales growth as compared to the economy, industry, or peers.* Abnormal growth may be the result of superior management or products but may also indicate accounting irregularities. Receivables growing faster than sales may be an indication of aggressive revenue recognition. Inventory growing faster than sales may indicate a slow-down in demand.

*Disproportionate fourth quarter revenues for a non-seasonal firm.* May be an indication of the aggressive revenue recognition to meet analyst forecasts.

## DETECTING EXPENSE RECOGNITION PROBLEMS

Manipulation techniques include understating expenses, delaying expenses, and misclassifying ordinary expenses as nonrecurring or nonoperating.

### Understating Expenses

Firms must disclose the depreciation methods used as well as broad summaries of useful lives. Comparing depreciation expense (relative to gross plant and equipment) to other companies can be useful in determining the conservatism of the firm's estimates.

Detecting understated expenses involves focusing on the related balance sheet accounts such as fixed assets and inventory. Like revenue recognition, large changes in these accounts are suspect.

Increasing inventory is often an indication of obsolescence. Analysts often focus on the firm's days' inventory on hand (DOH) to uncover obsolete inventory. DOH is equal to the number of days in the period divided by inventory turnover, and it measures the number of days it takes to sell inventory. An increasing DOH may be indicative of obsolete inventory. If the firm does not recognize the obsolete inventory, its earnings are overstated.



*Professor's Note: You might also see this referred to as Days' Inventory Outstanding on the exam.*

Analysts must be careful in interpreting a firm's DOH because the measure can vary if the firm is increasing its inventory in anticipation of future sales.

Analysts must also check the footnotes to determine if the firm has engaged in a LIFO liquidation. A LIFO liquidation involves selling more goods than are replaced; thus, the firm penetrates the older, lower cost layers of inventory thereby increasing profit. The profitability is not sustainable, however, because the firm will eventually run out of

older, cheaper inventory. For analytical purposes, the profit from the liquidation should be removed from the income statement.

### Detecting Delaying Expenses

Detecting improperly capitalized cost involves comparing asset growth to sales growth. Not only should this analysis be conducted on the firm but also on its sector group. When excess capacity is available and margins are declining, a growing asset base may be indicative of improperly capitalized costs (bad asset growth). On the other hand, a growing asset base when little capacity is available and margins are attractive is indicative of good asset growth. Because evaluating the quality of asset growth is a difficult task, analysts should view all asset growth with a degree of skepticism.

To eliminate the effects of capitalizing costs, it is necessary to increase expenses by the change in the net fixed assets for the period. Recall that the difference in net fixed assets and gross fixed assets is the amount of accumulated depreciation.

Let's look at an example.

#### Example: Expensing costs that were capitalized during the period

Using the following fixed asset disclosure, calculate the after-tax effect of expensing the fixed assets that were capitalized during 2009 assuming a tax rate of 40%:

<i>(¥ in thousands)</i>	<i>2009</i>	<i>2008</i>
Fixed assets, at cost	¥24,300	¥22,000
Accumulated depreciation	10,500	9,000

#### Answer:

To adjust for the fixed assets that were capitalized during 2009, the increase in net fixed assets for the year is added to expense. The increase in net fixed asset was ¥800 [(¥24,300 gross fixed assets for 2009 – ¥10,500 accumulated depreciation) – (¥22,000 gross fixed assets for 2008 – ¥9,000 accumulated depreciation)].

The after-tax effect of expensing fixed assets purchased in 2009 is ¥480 [¥800 increase in net fixed assets  $\times$  (1 – 40%)].

We can also examine the growth in the NOA measure as discussed earlier. Significant growth in accruals ratio may be associated with lower future performance.

Capitalizing costs can also affect cash flow from operations. Capitalizing a cost is usually reported on the cash flow statement as an outflow from investing activities. Immediately expensing a cost is reported as an outflow from operating activities. Thus, a firm that capitalizes costs will report higher cash flow from operations.

## Misclassifying Operating Expenses as Nonrecurring or Nonoperating

One suggested method of detecting misclassification involves calculating the firm's core operating margin. Core operating margin measures the pretax return on sales from the firm's normal operations and is calculated as follows:

$$\text{core operating margin} = \frac{\text{sales} - \text{COGS} - \text{SG\&A}}{\text{sales}}$$

where:

COGS = cost of goods sold

SG&A = selling, general, and administrative expense

Analysts should compare changes in the core operating margin over time and look for negative nonrecurring or nonoperating items that occurred when the ratio increased. This may be the result of misclassifying an operating expense.

## DETECTING BALANCE SHEET PROBLEMS

### Off-Balance-Sheet Financing

We will focus on the most popular form of off-balance-sheet financing, operating leases.

For analytical purposes, it is recommended that operating leases be treated as capital leases. This involves adding the present value of the lease payments to the lessee's assets and liabilities. This will increase leverage and decrease asset turnover. In addition, the rent expense should be removed from the income statement and replaced with depreciation expense and interest expense. The lessee's footnote disclosure provides some, but not all, of the data necessary to make the adjustments.

Lessees are required to disclose useful information about capital leases and operating leases in the financial statements or in the footnotes. For example, the lessee must disclose the lease payments that are due in each of the next five years. Lease payments due after five years are usually aggregated.

Unfortunately, the interest rate used in the lessee's calculations is not always disclosed. Thus, it may be necessary for an analyst to derive the interest rate in order to make adjustments for analytical purposes. The interest rate is simply the internal rate of return (IRR) of the future lease payments; that is, the interest rate that equates the present value of the lease and the future lease payments.

**Example: Lessee's footnote disclosure**

Mustang Company conducts part of its operations from leased premises using various capital leases that expire in ten years. In addition, Mustang leases equipment under non-cancelable operating leases. The future minimum lease payments are:

<i>Years</i>	<i>Capital Leases</i>	<i>Operating Leases</i>
2010	\$570	\$125
2011	570	110
2012	530	90
2013	290	70
2014	260	65
Thereafter (evenly from 2015–2019)	<u>1,000</u>	<u>250</u>
Total minimum lease payments	\$3,220	\$710
Less interest portion	<u>865</u>	
Present value of future minimum lease payments	\$2,355	

**Part A.** Calculate the implicit interest rate used by the lessee.

**Part B.** Assume that Mustang reported debt of \$2,950 and equity of \$800 at the end of 2009. If Mustang had treated the operating leases as capital leases, calculate the effects on the debt-to-equity ratio.

**Answer:**

**Part A.** Use the IRR function on your financial calculator to solve for the interest rate that will equate the present value of \$2,355 with the future capital lease payments. Inputting the following will result in an IRR of 8.2%.

<i>Year</i>	<i>Cash Flow</i>	<i>Calculator Register</i>
	–2,355	CF <sub>0</sub>
2010	570	CF <sub>1</sub>
2011	570	CF <sub>2</sub>
2012	530	CF <sub>3</sub>
2013	290	CF <sub>4</sub>
2014	260	CF <sub>5</sub>
2015	200	CF <sub>6</sub>
2016	200	CF <sub>7</sub>
2017	200	CF <sub>8</sub>
2018	200	CF <sub>9</sub>
2019	200	CF <sub>10</sub>

**Part B.** Use the NPV function on your financial calculator to compute the present value of the operating lease payments discounted at the implicit interest rate of 8.2%. Inputting the following will result in a PV of \$509.

Year	Cash Flow	Calculator Register
	0	CF <sub>0</sub>
2010	125	CF <sub>1</sub>
2011	110	CF <sub>2</sub>
2012	90	CF <sub>3</sub>
2013	70	CF <sub>4</sub>
2014	65	CF <sub>5</sub>
2015	50	CF <sub>6</sub>
2016	50	CF <sub>7</sub>
2017	50	CF <sub>8</sub>
2018	50	CF <sub>9</sub>
2019	50	CF <sub>10</sub>

Mustang's reported debt-to-equity ratio was 3.7 (\$2,950 debt / \$800 equity). Adjusting Mustang's debt for the operating lease results in a debt-to-equity ratio of 4.3 [(\$2,950 reported debt + \$509 PV of operating lease) / \$800 reported equity].



*Professor's Note: Alternatively, we can approximate the present value of the operating lease by dividing the present value of the capital lease of \$2,355 by the total capital lease payments of \$3,220 and then multiply the result of 73.1% by the total future operating lease payments. Using the approximation, the present value of the operating lease is \$519 [(\$2,355 present value of capital lease / \$3,220 total capital lease payments) × \$710 total operating lease payments]. The approximation of \$519 is close to the actual present value of the operating lease of \$509.*

## Goodwill

A discussion of a firm's goodwill is often found in the footnotes. Analysts should examine the year-over-year changes in goodwill and also consider the lack of impairment given overall economic conditions. This is especially true for a firm with a book value that is greater than its market capitalization.

Following is a brief discussion of other balance sheet issues that may impact earnings.

*Immediate write-off of purchased in-process research and development (IPR&D).* By expensing the IPR&D immediately, earnings are overstated in the future. In this case, there is no matching of future revenues with the expenses incurred to generate the revenues.



*Use of special purposes entities (SPE).* Income can be overstated if assets are transferred to an SPE at inflated amounts. Once transferred, assets and liabilities remain off-balance-sheet.

*Revaluing deferred tax assets.* Firms periodically revalue deferred tax assets to reflect the likelihood of use. Revaluing a deferred tax asset is done through a valuation allowance account. Decreasing the valuation allowance will increase deferred tax assets and results in higher earnings.

*Receivable sale with recourse.* Although the transaction is recorded as a sale, thereby decreasing accounts receivable and increasing operating cash flow, the buyer usually has limited exposure (i.e., the risk of not collecting a receivable is borne by the seller). Therefore, the transaction is nothing more than a collateralized borrowing arrangement that remains off-balance-sheet.

*Use of the equity method when substantial ownership exists.* With the equity method, the investor reports its pro-rata share of the net assets of the investee. The separate assets and liabilities of the investee are not reported. In addition, the investor reports its pro-rata share of the investee's earnings, not the separate revenues and expenses.

## CASH FLOW STATEMENT

### Misclassifying Cash Flow

The effects of misclassifying cash flow can be eliminated by including operating cash flow and investing cash flow when assessing earnings quality. This is exactly what was done in the cash flow accrual ratio discussed earlier.

### Ignoring Cash Flow

Analysts should compare the growth of operating leases with the firm's asset growth. Since an operating lease is maintained off-balance-sheet, an increase in operating lease activity is excluded from the accrual amounts used to analyze earnings quality.

### Managing Cash Flow

Analysts should be on alert for a decrease in discretionary spending, especially near the end of the year.

## KEY CONCEPTS

### LOS 27.a

With the cash basis of accounting, revenues are recognized when cash is collected, and expenses are recognized when cash is paid.

With the accrual basis of accounting, revenues are recognized when earned, and expenses are recognized when incurred, regardless of the timing of cash flow. Accrual accounting provides more timely and relevant information to users.

Accrual accounting necessitates the use of discretion because of the many estimates and judgments involved. Many of these estimates are subjective and can be “strategically” manipulated by management to achieve a desired result.

### LOS 27.b

Disaggregating accrual-based income into a cash component and an accrual component enhances its predictive ability. Because the accrual component is less persistent than the cash component, an analyst should apply a lower weighting to the accrual component.

Lower persistency is not always the result of strategic manipulation. Estimation errors can also be unintentional. However, if the analyst fails to assign a lower weighting to the accrual component of the earnings, securities may be misvalued.

### LOS 27.c

There is an incentive for firms to meet or exceed the market’s expectations. Studies have shown that more firms report small profits as compared to firms that report small losses, and more firms report earnings that slightly exceed sell-side forecasts as compared to firms that just miss the forecasts.

Mechanisms designed to prevent manipulation:

- An independent audit.
- The board of directors.
- Certification by senior management.
- Class action litigation.
- Regulators.
- General market scrutiny.

### LOS 27.d

Earnings quality usually refers to the persistence and sustainability of a firm’s earnings. The following ratios can be used to measure earnings quality (higher ratio, lower earnings quality):

$$\text{balance sheet based accruals ratio} = \frac{(\text{NOA}_{\text{END}} - \text{NOA}_{\text{BEG}})}{(\text{NOA}_{\text{END}} + \text{NOA}_{\text{BEG}}) / 2}$$

$$\text{cash flow based accruals ratio} = \frac{(\text{NI} - \text{CFO} - \text{CFI})}{(\text{NOA}_{\text{END}} + \text{NOA}_{\text{BEG}}) / 2}$$

**LOS 27.e**

Earnings at extreme levels tend to revert back to normal levels over time (mean reversion); thus, extreme earnings (high or low) should not be expected to continue indefinitely. When earnings are largely comprised of accruals, mean reversion will occur even faster.

**LOS 27.f**

Manipulation techniques can be classified into the following categories:

- Revenue recognition—misstating revenue, accelerating revenue, and misclassifying nonrecurring or nonoperating revenue.
- Expense recognition—understating expenses, delaying expenses, and misclassifying ordinary expenses as nonrecurring or nonoperating.
- Balance sheet manipulation—off-balance-sheet financing and goodwill.
- Cash flow statement manipulation—misclassifying cash flows, ignoring cash flows, and managing cash flows.

Different detection techniques exist for each category of manipulation techniques.

Revenue recognition:

- Look for large changes in receivables and unearned revenue.
- Look for increasing DSO.
- Compare revenue to actual cash collected.

Expense recognition:

- Look for large changes in fixed assets and inventory.
- Look for increasing DOH.
- Look for LIFO liquidation.
- Comparing depreciation expense (relative to gross plant and equipment) to other companies to determine the conservatism of the firm's estimates.
- Calculate core operating margin =  $(\text{sales} - \text{COGS} - \text{SG\&A}) / \text{sales}$ .

Balance sheet:

- Capitalize operating leases.
- Look for lack of goodwill impairment.

Cash flow statement:

- Compare the growth of operating leases with the firm's asset growth.
- Be alert for a decrease in discretionary spending, especially near year-end.

## CONCEPT CHECKERS

1. Which of the following statements about the accrual basis of accounting is *least accurate*?
  - A. Revenue is recognized when cash is received, and expenses are recognized when payment is made.
  - B. Revenues and expenses may be allocated to time periods other than those in which the cash flows occur.
  - C. Reported income provides a measure of the firm's current operating performance.
2. Which of the following accounting methods *best* provides timely and relevant information for decision making purposes?
  - A. Cash basis.
  - B. Tax basis.
  - C. Accrual basis.
3. Which of the following statements about accruals and the persistence of earnings is *most accurate*?
  - A. If an investor fails to assign a higher weighting to the accrual component of earnings, securities become mispriced.
  - B. Lower persistency is always the result of management manipulation.
  - C. The accrual component of earnings is more transitory than the cash component.
4. The main objective of an independent audit is to:
  - A. assess how well managers of the organization have done their jobs.
  - B. prepare all necessary financial statements for reporting purposes.
  - C. determine whether financial statements were prepared in accordance with generally accepted accounting principles.
5. Which of the following would *least likely* be a motivation to overstate net income?
  - A. Negotiate labor union contracts.
  - B. Meet earnings expectations.
  - C. Higher incentive compensation.
6. Which of the following is *least likely* to prevent discretionary abuse?
  - A. An independent audit.
  - B. Certification by senior management.
  - C. Lending covenants.

7. Using the following information, calculate the cash flow accruals ratio:

Operating income	20,000
Net income	12,000
Cash from operations	33,000
Cash from investing	(30,000)
Cash from financing	(10,000)
Average total assets	90,000
Average net operating assets	180,000

- A. 5.0%.  
B. 10.0%.  
C. 11.1%.

8. Following are the balance sheet accrual ratios for Firm X and Firm Y:

	2007	2006
Firm X	10.2%	15.6%
Firm Y	7.3%	4.7%

Which of the following statements is *most accurate*?

- A. Firm Y's earnings quality is higher as compared to Firm X.  
B. Firm X's earnings quality is deteriorating.  
C. Firm Y's earnings quality is improving

9. Which of the following statements about mean reversion is *least accurate*?
- A. When earnings are largely comprised of accruals, mean reversion will occur more quickly.  
B. The competitive marketplace rewards successful results thereby increasing future returns.  
C. Extreme earnings should not be expected to continue indefinitely.
10. Gateway Corporation reported sales of \$180,000 for the current year. If accounts receivable increased \$24,000 during the year and unearned revenue decreased \$4,000 during the year, cash collected from sales was:
- A. \$152,000.  
B. \$156,000.  
C. \$160,000.
11. The basic difference in a capital lease and an operating lease is:
- A. the term of the lease agreement.  
B. the use restrictions placed on the lessee.  
C. a capital lease is, in substance, a purchase of an asset, while an operating lease is a rental of an asset.
12. Which of the following is *most likely* a potential warning sign of overstated revenue?
- A. Over time, earnings have been growing faster than operating cash flow.  
B. Consistent bad debt allowance relative to receivables and past credit losses.  
C. Increase in inventory turnover of a toy retailer in the fourth quarter.

13. All of the following would immediately increase earnings except:
  - A. selling more inventory than is purchased or produced.
  - B. lowering the salvage value of depreciable assets.
  - C. holding the accounting period open past year-end.
14. Which of the following will *most likely* result in higher earnings quality?
  - A. Using aggressive pension assumptions.
  - B. Structuring a lease transaction to avoid capitalization on the balance sheet.
  - C. Recognizing revenue once the earnings process is complete.

## ANSWERS – CONCEPT CHECKERS

1. A Recognizing revenue when cash is received and recognizing expenses when paid is the definition of the cash basis of accounting.
2. C The accrual basis of accounting produces a net income figure that is more timely in communicating a firm's profit generating ability. Under the cash basis, profit is not communicated until cash is received or paid.
3. C Because the accrual component of earnings is based on estimates, it is *more* transitory (less persistent) than the cash component of earnings. If an investor fails to assign a *lower* weighting to accrual component of the earnings, securities become mispriced. Lower persistency is *not necessarily* the result of management manipulation. Estimation errors can be unintentional.
4. C Financial statements are evaluated by auditors for compliance with GAAP. Management prepares the financial statements, not the auditor. The board of directors and investors will assess how well managers have performed.
5. A Negotiating labor union contracts would be a reason to understate earnings.
6. C Lending covenants are more of an incentive to engage in discretionary abuse. If a firm is in non-compliance with its lending covenants, the lender can demand immediate repayment of the debt.
7. A The cash flow accruals ratio is 5%  $[(12,000 \text{ net income} - 33,000 \text{ CFO} + 30,000 \text{ CFI}) / 180,000 \text{ average NOA}]$ .
8. A Firm Y's earnings quality is higher because its accrual ratios are lower in both years. Firm X's earnings quality is *improving* while Firm Y's is *deteriorating*.
9. B In a competitive environment, capital flows to successful projects thereby increasing competition and *lowering* returns.
10. A Cash collections are \$152,000  $(\$180,000 \text{ sales} - \$24,000 \text{ increase in receivables} - \$4,000 \text{ decrease in unearned revenue})$ .
11. C A capital lease is treated just like an outright purchase using 100% debt financing.
12. A Over time, there should be a fairly stable relationship between earnings growth and growth in operating cash flow.
13. B Lowering the salvage value will result in higher depreciation expense and, thus, *lower* earnings.
14. C Revenues are recognized when realized and earned. Revenues are earned when the seller no longer has an obligation to deliver goods or services; that is, the earnings process is complete. The result is higher earnings quality.

# INTEGRATION OF FINANCIAL STATEMENT ANALYSIS TECHNIQUES

Study Session 7

## EXAM FOCUS

This is a key topic review in Study Session 7, and perhaps as important as any of the financial statement analysis material. Here, you are required to use material presented earlier to make appropriate adjustments to the balance sheet and income statement using a common framework. Make sure you can determine and interpret the effects of management's choice of accounting methods and assumptions on the reported financial results and ratios.

**LOS 28.a: Demonstrate the use of a framework for the analysis of financial statements, given a particular problem, question, or purpose (e.g., valuing equity based on comparables, critiquing a credit rating, obtaining a comprehensive picture of financial leverage, evaluating the perspectives given in management's discussion of financial results).**

The primary purpose of financial statement analysis is to identify potential outcomes, good or bad, that could affect an investment decision.

A basic framework, presented in Figure 1, has been developed to assist the user based on the objectives of the analysis. The framework can be used in making decisions about an equity ownership interest in a firm, a lending decision, evaluating a credit rating, or anticipating the impact on a firm of a change in accounting standards.

Figure 1: Framework for Analysis

<i>Step</i>	<i>Input</i>	<i>Output</i>
1. Establish the objectives	<ul style="list-style-type: none"><li>• Perspective of the analyst (e.g., evaluating a debt/equity investment or issuing a credit rating)</li><li>• Needs or concerns communicated by the client or supervisor</li><li>• Institutional guidelines</li></ul>	<ul style="list-style-type: none"><li>• Purpose statement</li><li>• Specific questions to be answered</li><li>• Nature and content of the final report</li><li>• Timetable and resource budget</li></ul>
2. Collect data	<ul style="list-style-type: none"><li>• Financial statements</li><li>• Communication with management, suppliers, customers, and competitors</li></ul>	<ul style="list-style-type: none"><li>• Organized financial information</li></ul>



Figure 1: Framework for Analysis (cont.)

<i>Step</i>	<i>Input</i>	<i>Output</i>
3. Process data	<ul style="list-style-type: none"> <li>Data from Step 2</li> </ul>	<ul style="list-style-type: none"> <li>Adjusted financial statements</li> <li>Common-size statements</li> <li>Ratios</li> <li>Forecasts</li> </ul>
4. Analyze data	<ul style="list-style-type: none"> <li>Data from Steps 2 and 3</li> </ul>	<ul style="list-style-type: none"> <li>Results</li> </ul>
5. Develop and communicate conclusions	<ul style="list-style-type: none"> <li>Results from analysis</li> <li>Published report guidelines</li> </ul>	<ul style="list-style-type: none"> <li>Report answering questions posed in Step 1</li> <li>Recommendations</li> </ul>
6. Follow up	<ul style="list-style-type: none"> <li>Periodically updated information</li> </ul>	<ul style="list-style-type: none"> <li>Updated analysis and recommendations</li> </ul>

Of course, which data are processed and analyzed will depend on the specific objectives of the analysis. In the example we present here, the objective is an analysis of a purchase decision for a long-term equity investment. The analysis focuses on the following:

- Sources of earnings and return on equity.
- Asset base.
- Capital structure.
- Capital allocation decisions.
- Earnings quality and cash flow analysis.
- Market value decomposition.
- Off-balance-sheet financing.
- Anticipating changes in accounting standards.



*Professor's Note: A detailed example of financial statement adjustments and analysis is the best way to address the LOS in this topic review. To make the example easier to follow, we provide the financial statement data necessary to conduct our analysis as needed, rather than all at once.*

### **LOS 28.b: Identify financial reporting choices and biases that affect the quality and comparability of companies' financial statements and illustrate how such biases affect financial decisions.**

We consider the acquisition of a minority equity interest in Thunderbird Corporation, a publicly held firm located in the United States. Thunderbird is a leading producer of electronic components used in automotive, aircraft, and marine applications.

#### **Sources of Earnings and Return on Equity**

We begin our analysis by identifying the sources of Thunderbird's earnings and determining whether these sources are sustainable over time.

Return on equity (ROE) can be decomposed using the extended DuPont equation, as follows:

$$\text{ROE} = \frac{\text{Tax Burden}}{\frac{\text{NI}}{\text{EBT}}} \times \frac{\text{Interest Burden}}{\frac{\text{EBT}}{\text{EBIT}}} \times \frac{\text{EBIT Margin}}{\frac{\text{EBIT}}{\text{revenue}}} \times \frac{\text{Total Asset Turnover}}{\frac{\text{revenue}}{\text{average assets}}} \times \frac{\text{Financial Leverage}}{\frac{\text{average assets}}{\text{average equity}}}$$

The DuPont decomposition allows us to identify the firm's performance drivers to potentially expose effects of weaker operations that are being masked by the effects of stronger operations. For example, a firm could offset a declining EBIT margin by increasing asset turnover or increasing leverage.

We must also consider the firm's sources of income and whether the income is generated internally from operations or externally. For example, the firm has less control over income that is generated by an ownership interest in an associate than over income generated internally. If equity income from associates is a significant source of earnings, we should isolate these effects by removing the equity income from our DuPont analysis to eliminate any bias.

As discussed in the topic review on Intercompany Investments, the equity method is used to account for influential investments (generally an ownership interest of 20% to 50%). Under the equity method, the investor recognizes its pro-rata share of the investee's earnings on the income statement. Eliminating the equity income from the investor's earnings permits analysis of the investor's performance resulting exclusively from its own asset base. Assuming the investee is profitable, this adjustment will decrease both the investor firm's earnings and net profit margin.

Since, under the equity method, the firm's investment is reported as a balance sheet asset, total assets should be reduced by the carrying value of investment. This will increase total asset turnover (smaller denominator). We can use the extended Dupont equation to determine the overall effect on ROE.



*Professor's Note: In order to make the accounting equation balance, you might be tempted to adjust equity downward for the elimination of the investment asset. However, without information about how the investment is financed (e.g., debt, stock, cash, or a combination), it would be arbitrary to adjust assets and equity for purposes of calculating financial leverage. Only if a question provided details on the method of financing the equity investment would you be able to determine financial leverage without the investment asset.*

We begin our extended example using the selected financial data for Thunderbird presented in Figure 2. Thunderbird owns a 30% equity interest in one of its suppliers, Eagle Corporation.

Figure 2: Selected Financial Data—Thunderbird Corporation

<i>\$ in millions</i>	<i>2009</i>	<i>2008</i>	<i>2007</i>	<i>2006</i>
<b>Income statement</b>				
Revenue	\$75,286	\$68,921	\$63,781	•
EBIT	10,517	9,311	8,313	•
EBT	9,463	8,474	7,258	•
Equity method income <sup>1</sup>	896	674	627	•
Net income	7,967	6,894	6,023	•
<b>Balance sheet</b>				
Total assets	\$80,261	\$71,264	\$71,903	\$61,731
Equity method investment	6,255	5,901	4,951	3,638
Stockholders' equity	37,964	36,994	34,348	27,382

<sup>1</sup>Not included in EBIT and EBT

Using these data, we can decompose Thunderbird's ROE using the extended DuPont equation.

Figure 3: Extended DuPont Analysis (as reported)

	<b>Tax Burden</b>	<b>×</b>	<b>Interest Burden</b>	<b>×</b>	<b>EBIT Margin</b>	<b>×</b>	<b>Total Asset Turnover</b>	<b>×</b>	<b>Financial Leverage</b>	<b>=</b>	<b>ROE</b>
2007	82.98%		87.31%		13.03%		0.955		2.165		19.51%
2008	81.35%		91.01%		13.51%		0.963		2.007		19.33%
2009	84.19%		89.98%		13.97%		0.994		2.021		21.26%

Note the slight improvement in ROE over the period, from 19.51% to 21.26%. The decomposition reveals that this is the result of an increasing EBIT margin and decreased effects of taxes and interest, which is offset to some degree by a reduction in financial leverage. Note that an increase in the interest and tax burden ratios indicates that the effective tax rate and impact of interest charges on operating earnings have *decreased*.

By removing the equity income of Eagle from earnings and the equity investment from total assets, we can examine Thunderbird's performance on a standalone basis.

Figure 4: Extended DuPont Analysis (excluding equity income and investment asset)

	Tax Burden <sup>1</sup>	×	Interest Burden	×	EBIT Margin	×	Total Asset Turnover <sup>2</sup>	×	Financial Leverage	=	ROE
2007	74.35%		87.31%		13.03%		1.020		2.165		18.68%
2008	73.40%		91.01%		13.51%		1.042		2.007		18.87%
2009	74.72%		89.98%		13.97%		1.080		2.021		20.51%

<sup>1</sup> (net income – equity income) / EBT

<sup>2</sup> revenue / [(beginning total assets – beginning equity investment + ending total assets – ending equity investment) / 2]

As compared to the reported ROE (Figure 3), adjusted ROE (Figure 4) is decreased by eliminating equity income and the investment asset. Note that EBIT margin did not change because Thunderbird did not include equity income from Eagle as a part of EBIT.

### Asset Base

Analysis of the asset base requires an examination of changes in the composition of balance sheet assets over time. Presenting balance sheet items in a common-size format (as a proportion of total assets) is a useful starting point.

We begin by examining a common-size presentation of Thunderbird's assets in Figure 5.

Figure 5: Total Assets

<i>\$ in millions</i>	2009		2008		2007	
Current assets	\$25,039	31.2%	\$24,714	34.7%	\$29,236	40.7%
PP&E	15,445	19.2%	14,161	19.9%	13,293	18.5%
Identifiable intangibles	5,052	6.3%	2,641	3.7%	1,996	2.8%
Goodwill	23,396	29.1%	19,959	28.0%	18,893	26.3%
Other noncurrent assets	<u>11,329</u>	14.1%	<u>9,789</u>	13.7%	<u>8,485</u>	11.8%
Total assets	\$80,261		\$71,264		\$71,903	

A manufacturing firm, such as Thunderbird, is expected to have considerable investments in both current assets (primarily receivables and inventory) and fixed assets (primarily plant, property, and equipment). However, note the significance of goodwill, which is 29.1% of total assets at the end of 2009. Goodwill is an unidentifiable intangible asset representing the difference between the purchase price and market value of identifiable assets with finite lives in a business acquisition reported under the purchase method.

According to Figure 5, goodwill has increased since 2007, indicating Thunderbird has completed a number of business acquisitions.

The increases in Thunderbird's EBIT margin and ROE (Figure 3) may be partially due to successful acquisitions. However, since goodwill is no longer amortized through the income statement, we must consider the possibility of losses in the future if goodwill is determined to have been impaired.

## Capital Structure

A firm's capital structure must be able to support management's strategic objectives as well as to allow the firm to honor its future obligations.

Referring to Figure 3, Thunderbird's financial leverage ratio has decreased over the last three years from 2.2 in 2007 to 2.0 in 2009. Unfortunately, the ratio does not reveal the true nature of the leverage, as some liabilities are more burdensome than others. Financial liabilities and bond liabilities, for example, can be placed in default if not paid on time, or in the event of noncompliance with the lending covenants (technical default). On the other hand, liabilities such as employee benefit obligations, deferred taxes, and restructuring provisions are less burdensome and may or may not require a cash outflow in the future.



*Professor's Note: Recall that a deferred tax liability (DTL) from differences between financial depreciation and tax depreciation may, or may not, be expected to reverse in the foreseeable future, depending on the growth in the firm's new capital investment. The liability can be treated as equity for analytical purposes when capital expenditures are growing and the DTL is not expected to reverse.*

Next, we will examine the components of Thunderbird's long-term capital.

**Figure 6: Long-Term Capital**

<i>\$ in millions</i>	<i>2009</i>		<i>2008</i>		<i>2007</i>	
Long-term debt	\$4,290	8.6%	\$4,866	10.0%	\$5,794	12.4%
Other long-term liabilities	7,679	15.4%	6,669	13.7%	6,663	14.2%
Stockholders' equity	37,964	76.0%	36,994	76.2%	34,348	73.4%
Total long-term capital	\$49,933		\$48,529		\$46,805	

Thunderbird's long-term debt has decreased from 12.4% of long-term capital in 2007 to 8.6% in 2009, a significant decrease in financial leverage.

Given that Thunderbird's long-term debt has decreased, we consider the possibility of an offsetting change in the firm's working capital. Various working capital ratios are presented in Figure 7.

Figure 7: Selected Working Capital Data and Ratios

<i>\$ in millions</i>	<i>2009</i>	<i>2008</i>	<i>2007</i>	<i>2006</i>
<b>Balance sheet</b>				
Cash and equivalents	\$4,616	\$3,695	\$3,261	\$3,431
Marketable securities	2,031	4,338	8,915	7,266
Accounts receivable	10,795	10,204	10,004	8,266
Inventories	6,490	5,620	5,713	4,918
Other current assets	<u>1,107</u>	<u>857</u>	<u>1,343</u>	<u>818</u>
Current assets	\$25,039	\$24,714	\$29,236	\$24,699
Accounts payable	\$9,925	\$8,800	\$7,782	\$6,352
Current portion long-term debt	17,179	10,846	13,189	10,305
Other current liabilities	<u>3,224</u>	<u>3,089</u>	<u>4,127</u>	<u>3,732</u>
Current liabilities	\$30,328	\$22,735	\$25,098	\$20,389
<b>Other data</b>				
Revenue	\$75,286	\$68,921	\$63,781	•
Cost of goods sold	31,526	28,499	26,542	•
Purchases*	32,396	28,406	27,337	•
Average daily expenditures	173.3	159.5	148.4	•
<b>Working capital ratios</b>				
Current ratio	0.83	1.09	1.16	•
Quick ratio	0.58	0.80	0.88	•
Defensive interval ratio	100.6	114.3	149.4	•
Days' sales outstanding (DSO)	50.9	53.5	52.3	•
Days' inventory on hand (DOH)	70.1	72.6	73.1	•
Days' payables	<u>(105.5)</u>	<u>(106.5)</u>	<u>(94.4)</u>	•
Cash conversion cycle	15.5	19.6	31.0	•

\* Purchases = COGS + ending inventory – beginning inventory

Both the current ratio and quick ratio have declined as a result of both the increase in the current portion of long-term debt and the decrease in marketable securities. The defensive interval ratio has been declining due to both an increase in daily expenditures and a decrease in marketable securities.

On the other hand, the firm appears to be better managing its receivables, inventory, and payables, as shown by a decrease in the cash conversion cycle from 31.0 days to 15.5 days. Receivables are being collected sooner (declining DSO), inventory turnover has increased (declining DOH), and the firm is paying suppliers more slowly (increasing days' payables).

## Capital Allocation Decisions

Consolidated financial statements can hide the individual characteristics of dissimilar subsidiaries. As a result, firms are required to disaggregate financial information by segments to assist users.

Recall that a business segment is a portion of a larger company that accounts for more than 10% of the company's revenues or assets, and is distinguishable from the company's other line(s) of business in terms of risk and return characteristics. Geographic segments are also identified based on the same criteria.

Although required disclosure under U.S. GAAP and IFRS is limited, the disclosures are valuable in identifying each segment's contribution to revenue and profit, the relationship between capital expenditures and rates of return, and which segments should be de-emphasized or eliminated.

Continuing our example, Thunderbird operates four different divisions: aircraft, automotive, marine, and specialty products. Figure 8 presents Thunderbird's revenue and EBIT by segment.

**Figure 8: Revenue and EBIT by Segment**

<i>\$ in millions</i>	<i>2009</i>		<i>2008</i>		<i>2007</i>	
<b>Revenue</b>						
Aircraft	\$11,027	14.6%	\$8,856	12.8%	\$7,863	12.3%
Automotive	34,631	46.0%	32,754	47.5%	30,276	47.5%
Marine	22,345	29.7%	20,566	29.8%	19,491	30.6%
Specialty	<u>7,283</u>	9.7%	<u>6,745</u>	9.8%	<u>6,151</u>	9.6%
	\$75,286		\$68,921		\$63,781	
<b>EBIT</b>						
Aircraft	\$2,440	23.2%	\$1,955	21.0%	\$1,696	20.4%
Automotive	5,059	48.1%	4,674	50.2%	4,115	49.5%
Marine	2,482	23.6%	2,160	23.2%	2,020	24.3%
Specialty	<u>536</u>	5.1%	<u>522</u>	5.6%	<u>482</u>	5.8%
	\$10,517		\$9,311		\$8,313	

Figure 8 reveals that in terms of contributing revenue and EBIT, the automotive division is the largest segment while the specialty products division is the smallest. Also, the percentage contribution to EBIT by the specialty products division declined from 5.8% in 2007 to 5.1% in 2009.

Thunderbird's assets and capital expenditures by segment are presented in Figure 9.

Figure 9: Assets and Capital Expenditures by Segment

<i>\$ in millions</i>	<i>2009</i>		<i>2008</i>		<i>2007</i>	
<b>Assets*</b>						
Aircraft	\$14,777	27.5%	\$6,861	15.4%	\$5,288	12.8%
Automotive	20,059	37.4%	19,553	43.9%	19,166	46.6%
Marine	12,310	22.9%	11,927	26.8%	10,779	26.2%
Specialty	<u>6,509</u>	12.1%	<u>6,219</u>	14.0%	<u>5,928</u>	14.4%
	\$53,655		\$44,560		\$41,161	
<b>Capital expenditures</b>						
Aircraft	\$383	11.3%	\$336	11.8%	\$240	10.4%
Automotive	1,432	42.3%	1,199	42.1%	1,018	44.3%
Marine	841	24.8%	667	23.4%	618	26.9%
Specialty	<u>730</u>	21.6%	<u>646</u>	22.7%	<u>421</u>	18.3%
	\$3,386		\$2,848		\$2,297	

\* Not equal to total assets due to unallocated and non-segment assets.

Not surprisingly, Figure 9 reveals that the automotive division requires the greatest proportion of assets and capital expenditures. Note that the specialty products division has the least assets of all four divisions and that the aircraft division has required the least capital expenditures. Also note that the capital expenditures of the specialty products division have increased over the period.

Using the percentages from Figure 9, we can calculate the ratio of proportional capital expenditures to proportional assets for each segment. A ratio greater than one indicates the firm is growing the segment by allocating a greater percentage of its capital expenditures to a segment than that segment's proportion of total assets. Conversely, a ratio of less than one indicates the firm is allocating a smaller percentage of its capital expenditures to a segment than its proportion of total assets. If these trends continue, the segments will represent a more or less significant proportion of the firm over time.

By comparing the EBIT margin contributed by each segment to its ratio of capital expenditure proportion to asset proportion, we can determine if the firm is investing its capital in its most profitable segments.

Figure 10: EBIT Margin and CapEx % to Assets % by Segment

	<i>EBIT Margin</i>			<i>CapEx % / Assets %</i>		
	<i>2009</i>	<i>2008</i>	<i>2007</i>	<i>2009</i>	<i>2008</i>	<i>2007</i>
Aircraft	22.1%	22.1%	21.6%	0.41	0.77	0.81
Automotive	14.6%	14.3%	13.6%	1.13	0.96	0.95
Marine	11.1%	10.5%	10.4%	1.08	0.87	1.03
Specialty	7.4%	7.7%	7.8%	1.79	1.62	1.27



From Figure 10, we note that while the specialty products division has, by far, the lowest EBIT margin, it has the highest capital expenditures proportion to assets proportion ratio. Additionally, the specialty products division's EBIT margin is declining. If Thunderbird continues to overallocate capital resources to the specialty products division, the firm's company-wide returns may suffer.

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**LOS 28.e: Analyze and interpret the effects of balance sheet modifications, earnings normalization, and cash-flow-statement-related modifications on a company's financial statements, financial ratios, and overall financial condition.**

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*Professor's Note: For continuity of our extended example, we present this LOS out of order.*

## Earnings Quality and Cash Flow Analysis

**Earnings quality** refers to the persistence and sustainability of a firm's earnings. Earnings that are closer to operating cash flow are considered higher quality. Of course, earnings are subject to accrual accounting events that require numerous judgments and estimates. As a result, earnings are more easily manipulated than cash flow.

We can disaggregate earnings into their cash flow and accruals components using either a balance sheet approach or a cash flow statement approach. With either approach, the ratio of accruals to average net operating assets can be used to measure earnings quality. The interpretation of both ratios is the same: the lower the ratio, the higher the earnings quality.

Figure 11 contains the necessary data to calculate the accruals ratio using both approaches.

Figure 11: Selected Balance Sheet and Cash Flow Data

<i>\$ in millions</i>	<i>2009</i>	<i>2008</i>	<i>2007</i>
<b>Balance sheet</b>			
Total assets	\$80,261	\$71,264	\$71,903
Cash and marketable securities	<u>(6,647)</u>	<u>(8,033)</u>	<u>(12,176)</u>
Operating assets	\$73,614	\$63,231	\$59,727
 Total liabilities	 \$42,297	 \$34,270	 \$37,555
Long-term debt	(4,290)	(4,866)	(5,794)
Short-term debt	<u>(17,179)</u>	<u>(10,846)</u>	<u>(13,189)</u>
Operating liabilities	\$20,828	\$18,558	\$18,572
 Net operating assets (NOA) <sup>1</sup>	 \$52,786	 \$44,673	 \$41,155
 Balance sheet accruals <sup>2</sup>	 \$8,113	 \$3,518	 \$6,541
<b>Cash flow statement</b>			
Net income	\$7,967	\$6,894	\$6,023
Operating cash flow	(9,407)	(8,173)	(7,144)
Investing cash flow	<u>11,027</u>	<u>7,364</u>	<u>3,261</u>
Cash flow accruals	\$9,587	\$6,085	\$2,140

<sup>1</sup> NOA totaled \$34,614 at the end of 2006

<sup>2</sup> Year-to-year change in NOA

Using the data contained in Figure 11, we can calculate the balance sheet and cash flow statement accruals ratios in Figure 12.

Figure 12: Balance Sheet and Cash Flow Accruals Ratios

<i>\$ in millions</i>	<i>2009</i>	<i>2008</i>	<i>2007</i>
<b>Balance sheet approach</b>			
$\frac{\text{BS accruals}}{\text{average NOA}}$	$\frac{\$8,113}{\$48,730} = 16.6\%$	$\frac{\$3,518}{\$42,914} = 8.2\%$	$\frac{\$6,541}{\$37,885} = 17.3\%$
<b>Cash flow statement approach</b>			
$\frac{\text{CF accruals}}{\text{average NOA}}$	$\frac{\$9,587}{\$48,730} = 19.7\%$	$\frac{\$6,085}{\$42,914} = 14.2\%$	$\frac{\$2,140}{\$37,885} = 5.6\%$

Under the balance sheet approach, the accruals ratio has fluctuated widely over the period, from 17.3%, down to 8.2% in 2008, and back up to 16.6%. Wide fluctuations like these may be an indication of earnings manipulation.

Equally disturbing, the accruals ratio calculated using the cash flow approach has steadily increased over the last three years from 5.6% in 2007 to 19.7% in 2009.



*Professor's Note: Although both accruals ratios are conceptually equivalent (both measure the degree of accruals present in a firm's earnings), their results can differ because of acquisitions and divestitures, exchange rate gains and losses, and inconsistent treatment of specific items on the balance sheet and on the cash flow statement. As noted earlier, Thunderbird has been involved in a number of acquisitions over the 3-year period.*

Because of the potential for earnings manipulation by increasing accruals, we decide to compare Thunderbird's cash flow to its operating income. Our interest is in determining whether operating income is confirmed by cash flow.

In order to compare the two measures, it is necessary to eliminate cash paid for interest and taxes from operating cash flow by adding them back. Operating cash flow includes interest and taxes while operating income does not.



*Professor's Note: Be careful when making the cash interest and tax adjustment to operating cash flow. Firms that follow IFRS have the choice of reporting cash paid for interest as an operating cash flow or as a financing cash flow. If a firm reports the interest as a financing cash flow, no interest adjustment is necessary.*

Using the data in Figure 13, we can calculate the ratio of cash flow to operating income.

**Figure 13: Cash Flow to Operating Income**

<i>\$ in millions</i>	2009	2008	2007
Operating cash flow (OCF)*	\$9,407	\$8,173	\$7,144
Cash interest paid	552	419	306
Cash taxes paid	2,150	1,968	1,778
OCF before interest and taxes	\$12,109	\$10,560	\$9,228
Operating income	\$10,517	\$9,311	\$8,313
OCF before interest and taxes / operating income	1.15	1.13	1.11

\* Includes cash paid for interest and taxes

The ratio of cash flow to operating income confirms that operating cash flow has exceeded operating income over the past three years. The results of this analysis reduce our earlier concerns of potential earnings manipulation from our accruals analysis.

In order to evaluate Thunderbird's recent acquisitions, we examine the cash return on total assets.

**Figure 14: Cash Return on Total Assets**

<i>\$ in millions</i>	2009	2008	2007
Operating cash flow	\$9,407	\$8,173	\$7,144
Average total assets	\$75,763	\$71,584	\$66,817
Operating cash flow / average total assets	12.4%	11.4%	10.7%

The cash return on total assets has increased over the period, which seems to justify the recent acquisitions. However, since the results of the accruals ratios, calculated in Figure 12, gave us cause for concern, we need to calculate cash flow to reinvestment, cash flow to total debt, and cash flow interest coverage ratios.

**Figure 15: Selected Cash Flow Ratios**

<i>\$ in millions</i>	2009	2008	2007
<b>Cash flow to reinvestment</b>			
Operating cash flow (OCF)	\$9,407	\$8,173	\$7,144
Capital expenditures	\$3,386	\$2,848	\$2,297
OCF / capital expenditures	2.8	2.9	3.1
<b>Cash flow to total debt</b>			
OCF before interest and taxes	\$12,109	\$10,560	\$9,228
Total debt	\$21,469	\$15,712	\$18,983
OCF before interest and taxes / total debt	56.4%	67.2%	48.6%
<b>Cash flow interest coverage</b>			
OCF before interest and taxes	\$12,109	\$10,560	\$9,228
Cash interest paid	\$552	\$419	\$306
OCF before interest and taxes / cash interest	21.9	25.2	30.2

All three cash flow measures presented in Figure 15 are reassuring. Although cash flow to reinvestment declined slightly over the period, cash flow still covered capital expenditures by 2.8 times in 2009. This indicates there are sufficient resources to fund Thunderbird's ongoing capital expenditures.

Cash flow to total debt of 56.4% in 2009 confirms Thunderbird's relatively low leverage. Cash flow interest coverage (the interest coverage ratio calculated on a cash-flow basis) has been declining over the past three years but, for 2009, cash flow still covered interest paid 21.9 times, which is excellent. With low leverage and high interest coverage, Thunderbird has the flexibility to increase its debt if the need arises.

## Market Value Decomposition

When a parent company has an ownership interest in an associate (subsidiary or affiliate), it may be beneficial to determine the *standalone* value of the parent; that is, the implied value of the parent without regard to the value of the associate. The implied value is equal to the parent's market value less the parent's pro-rata share of the

associate's market value. If the associate's stock is traded on a foreign stock exchange, it may be necessary to convert the market value of the associate to the parent's reporting currency.

As noted earlier, Thunderbird owns a 30% equity interest in Eagle Corporation, a publicly traded firm located in Europe. Let's assume the market capitalization of Thunderbird is \$137 billion. Also, let's assume the market capitalization of Eagle is €60 billion and, at year-end, the \$/€ exchange rate is \$1.40.

In this case, Thunderbird's pro-rata share of Eagle's market value is \$25.2 billion ( $€60 \text{ billion} \times 30\% \times \$1.40$ ). Therefore, the implied value of Thunderbird, excluding Eagle, is \$111.8 billion ( $\$137 \text{ billion} - \$25.2 \text{ billion}$ ) or 81.6% of Thunderbird's market capitalization ( $\$111.8 \text{ billion} / \$137 \text{ billion}$ ).

Next, let's compute Thunderbird's P/E multiple without regard to Eagle. Let's assume Thunderbird's P/E multiple is 17.1 ( $\$137 \text{ billion market capitalization} / \$8 \text{ billion net income}$ ). Assuming the S&P 500 multiple is 20.1, Thunderbird's P/E is a 15% discount to the P/E of the S&P index.

The implied P/E multiple of Thunderbird without regard to Eagle is 15.7 [ $\$111.8 \text{ billion implied value} / (\$8 \text{ billion Thunderbird net income} - \$896 \text{ million equity income from Eagle})$ ]. Thus, Thunderbird's implied P/E multiple is an even greater 22% discount to the S&P multiple.



*Professor's Note: Had Eagle's earnings been stated in euros, it would have been necessary to convert the earnings into dollars at the average exchange rate for the period. The average rate is used since it is assumed the earnings occurred evenly throughout the year.*

The discount to the S&P multiple seems excessive given Thunderbird's low leverage and strong cash flow position. Thus, Thunderbird's stock may be undervalued relative to the market.

Thunderbird's implied P/E multiple is a crude measure because of the potential differences in accounting methods used by the two firms—Thunderbird reports under U.S. GAAP while Eagle reports under IFRS.

We can summarize our findings as follows:

### Support for investment in Thunderbird

- Thunderbird's earnings growth has been generated internally from operations, through acquisitions, and by investment income from Eagle.
- Thunderbird's ROE is positive and trending upward. Investment income from Eagle has improved Thunderbird's ROE.
- Earnings quality appears to be good as operating earnings are confirmed by cash flow.
- Cash flow is sufficient to support capital expenditures and an increase in debt if necessary.

- Thunderbird is growing through acquisitions and its cash return on assets continues to increase.
- After eliminating Thunderbird's pro-rata share of Eagle's market value and equity income, Thunderbird appears to be undervalued based on its implied P/E multiple relative to that of the S&P index.

### Concerns

- Potential earnings manipulation as evidenced by increasing accrual ratios. However, this concern is reduced due to Thunderbird's strong cash flow.
- Thunderbird may be overallocating capital resources to the lowest margin segment (specialty products). Future monitoring will be required.
- Recent acquisitions may result in losses from goodwill impairment in the future.

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**LOS 28.c: Evaluate the quality of a company's financial data and recommend appropriate adjustments to improve quality and comparability with similar companies, including adjustments for differences in accounting rules, methods, and assumptions.**

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### Off-Balance-Sheet Financing

There are a number of financing arrangements that are not reported on the balance sheet. One of the most common forms of off-balance-sheet financing is operating leases.

Recall that an operating lease is simply a rental arrangement; that is, the lessee reports neither an asset nor a liability related to the lease on its balance sheet, even though the lessee may have a contractual obligation under the lease agreement. The lessee only reports rental expense, equal to the periodic lease payment, on the income statement.

Alternatively, a finance (capital) lease is, in substance, treated as a purchase of an asset financed with debt. Thus, the lessee reports an asset and a liability on its balance sheet. On the income statement, the lessee reports depreciation expense and interest expense instead of rental expense.

For analytical purposes, an operating lease should be treated as a finance lease, increasing assets and liabilities by the present value of the remaining lease payments. Since assets and liabilities are initially increased by the same amount, stockholders' equity is not affected by this adjustment. Capitalizing an operating lease will increase financial leverage because of the increase in liabilities.

On the income statement, it is necessary to replace the rental expense (payment) for the operating lease with depreciation expense (on the lease asset) and interest expense (on the lease liability). Recall that in the early years of a finance lease, depreciation expense and interest expense will exceed the lease payment. As a result, net income will be lower in the early years for a finance lease compared to an operating lease. In addition, by recognizing interest expense in the lessee's income statement, the interest coverage ratio will likely decline (higher denominator).

Consider an example. Roadrunner, Inc., the lessee, reports an agreement to finance manufacturing equipment as an operating lease. The discounted present value of the lease payments is \$9.1 million at an interest rate of 10%. The lease term is five years and the annual payment is \$2.4 million.

Figure 16 illustrates the effect analyst adjustments on selected leverage and interest coverage ratios.

**Figure 16: The Effect of Operating Lease Adjustments on Selected Ratios**

<i>\$ in thousands</i>	<i>Reported</i>	<i>Adjustments</i>	<i>Pro-Forma</i>
<b>Financial leverage</b>			
$\frac{\text{total assets}}{\text{total equity}}$	$\frac{\$71,940}{\$50,190} = 1.43$	9,100 <sup>a</sup> —	$\frac{\$81,040}{\$50,190} = 1.61$
<b>Total debt-to-equity</b>			
$\frac{\text{total debt}}{\text{equity}}$	$\frac{\$21,750}{\$50,190} = 0.43$	9,100 <sup>a</sup> —	$\frac{\$30,850}{\$50,190} = 0.61$
<b>Interest coverage</b>			
$\frac{\text{EBIT}}{\text{interest expense}}$	$\frac{\$4,160}{\$1,400} = 3.0$	2,400 <sup>b</sup> – 1,820 <sup>c</sup> 910 <sup>d</sup>	$\frac{\$4,740}{\$2,310} = 2.1$

<sup>a</sup> Present value of lease payments

<sup>b</sup> Rent expense (payment)

<sup>c</sup> Depreciation expense:  $9,100 / 5 \text{ years} = 1,820$

<sup>d</sup> Interest expense:  $9,100 \times 10\% = 910$

As a result of capitalizing the operating lease, financial leverage is increased and interest coverage is decreased.



*Professor's Note: Though not specifically discussed in this topic review, an analyst might also split the lease liability into a current portion (current liability) and non-current portion (long-term liability). This adjustment involves increasing current liabilities by the principal portion of the lease payment due within the next 12 months. The principal payment can be derived by subtracting the interest expense from the total lease payment. The non-current portion is simply equal to the difference in the total lease liability and the current portion. As a result of this adjustment, the current ratio decreases (higher denominator).*

Other examples of off-balance-sheet financing techniques are debt guarantees, sales of receivables with recourse, and take-or-pay agreements. In each case, the analytical adjustment is similar to the operating lease adjustment; that is, increase assets and liabilities by the amount of the transaction that is off-balance-sheet.

## LOS 28.d: Predict the impact on financial statements and ratios, given a change in accounting rules, methods, or assumptions.

### Anticipating Changing Accounting Standards

Users must be aware of proposed changes in accounting standards because of the financial statement effects and the potential impact on a firm's valuation. Over the next few years, significant accounting changes are expected as U.S. GAAP and IFRS converge.

For example, in the United States, the Financial Accounting Standards Board (FASB) is currently working on a proposal to potentially eliminate operating lease treatment in the financial statements. If enacted, firms would be required to capitalize operating leases. As discussed earlier, this may significantly increase reported leverage. Lease capitalization will also affect the firm's compliance with its bond covenants based on financial leverage calculated in accordance with U.S. GAAP. To avoid the increase in leverage from capitalizing a lease, the firm could raise additional equity, which would dilute existing investors' ownership interests.

The FASB is currently considering the elimination of qualified special purposes entities (QSPE). As discussed in the topic review on Intercorporate Investments, firms can avoid consolidating asset securitizations (primarily receivables) by creating a QSPE. As a result, the sponsor firm can remove assets from its balance sheet as if the assets had been sold.



*Professor's Note: It appears that QSPEs will not be permitted after January 1, 2010, according to a recent FASB decision.*

For example, assume that Blackhawk Corporation transferred receivables, totaling \$170 million, to a QSPE in exchange for cash. Once the transfer was complete, Blackhawk reported debt of \$1.3 billion and equity of \$580 million.

If the FASB were to eliminate the QSPE treatment, Blackhawk would increase both assets (receivables) and liabilities by \$170 million. This would significantly increase Blackhawk's leverage, as illustrated in Figure 17.

**Figure 17: QSPE Balance Sheet Adjustment**

<i>\$ in millions</i>	<i>As Reported</i>	<i>Adjusted</i>
Debt	\$1,300	\$1,470
Equity	\$580	\$580
Debt-to-equity ratio	2.24	2.53



*Professor's Note: Though not specifically discussed in this topic review, an analyst might also adjust interest expense for the implied interest expense on the liability. The result would be a decrease in the interest coverage ratio (higher denominator).*



## KEY CONCEPTS

### LOS 28.a

The basic financial analysis framework involves:

1. Establishing the objectives.
2. Collecting the data.
3. Processing the data.
4. Analyzing the data.
5. Developing and communicating the conclusions.
6. Following up.

### LOS 28.b

Use the extended DuPont equation to examine the sources of earnings and performance. Remove equity income from associates and the investment account to eliminate any bias.

Examine the composition of the balance sheet over time.

Determine if the capital structure can support future obligations and strategic plans by analyzing the components of long-term capital. Some liabilities don't necessarily result in an outflow of cash.

Segment disclosures are valuable in identifying the contribution of revenue and profit by each segment, the relationship between capital expenditures and rates of return, and identifying segments that should be de-emphasized or eliminated.

### LOS 28.c

The balance sheet should be adjusted for off-balance-sheet financing activities. Capitalize operating leases for analytical purposes by increasing assets and liabilities by the present value of the remaining lease payments. Also, adjust the income statement by replacing rent expense with depreciation expense on the lease asset and interest expense on the lease liability.

### LOS 28.d

Users must be aware of the proposed changes in accounting standards because of the financial statement effects and the potential impact on a firm's valuation.

### LOS 28.e

Earnings can be disaggregated into cash flow and accruals using a balance sheet approach and a cash flow statement approach. The lower the accruals ratio, the higher the earnings quality.

Earnings are considered higher quality when confirmed by cash flow. Cash flow can be compared to operating profit by adding back cash paid for interest and taxes to operating cash flow.

The standalone market value of a firm can be computed by eliminating the pro-rata market value of investment in associates.

An implied P/E multiple can be computed by dividing the standalone market value by earnings without regard to equity income from associates.

## CONCEPT CHECKERS

1. When applying the financial analysis framework, which of the following is the *best* example of output from processing data?
  - A. A written list of questions to be answered by management.
  - B. Audited financial statements.
  - C. Common-size financial statements.
2. When applying the financial analysis framework to the valuation of an equity security, communicating with company suppliers, customers, and competitors is an input that occurs while:
  - A. establishing the objective of the analysis.
  - B. processing data.
  - C. collecting data.
3. Lorenzo Company recently reported EBIT margin of 11%, total asset turnover of 1.2, a financial leverage ratio of 1.5, and interest burden of 70%. Assuming an income tax rate of 35%, Lorenzo's return on equity is *closest* to:
  - A. 9%.
  - B. 10%.
  - C. 11%.

4. McAdoo Corporation recently reported the following:

Earnings before interest and taxes	\$246,500
Interest expense	<u>(10,000)</u>
Earnings before taxes	\$236,500
Income taxes	(94,600)
Income from associates	<u>16,750</u>
Net income	\$158,650

Tax burden, without the regard to the investments in associates, is *closest* to:

- A. 57.6%.
  - B. 60.0%.
  - C. 67.1%.
5. Selected financial information from Westcreek Corporation follows:

	2009	2008
Revenue	\$848,000	\$732,800
Fixed assets	\$146,800	\$114,400
Investment in Creston Corp.	\$56,400	\$42,100
Total assets	\$468,000	\$363,600

At the end of 2009, Westcreek's total asset turnover, without regard to the investment in Creston, is *closest* to:

- A. 2.0.
  - B. 2.3.
  - C. 2.5.

6. Rainbow Corporation recently reported the following financial information for its two separate divisions:

<i>Division</i>	<i>EBIT Margin</i>	<i>Total Assets %</i>	<i>Total CapEx %</i>
Green	9.5%	60%	30%
Red	3.2%	40%	70%

Rainbow is *most likely* overallocating resources to:

- A. Red only.
- B. Green only.
- C. Red and Green.

Use the following information to answer Questions 7 and 8.

Big Company owns 25% of Small Company. Selected recent financial data for both firms follows:

	<i>Big</i>	<i>Small</i>
Net income	£16,000	€6,000
Market capitalization	£275,000	€150,000
Current exchange rate (£/€)	0.85	
Average exchange rate (£/€)	0.80	

7. The percentage of Big's value explained by its ownership of Small is *closest* to:
- A. 10.9%.
  - B. 11.6%.
  - C. 13.6%.
8. The implied P/E multiple of Big, without regard to Small, is *closest* to:
- A. 16.1.
  - B. 16.4.
  - C. 17.2.
9. Cullen Company created a qualified special purpose entity (QSPE) to securitize accounts receivable in accordance with generally accepted accounting principles. Cullen receives cash when the receivables are transferred to the QSPE. If the current accounting treatment for QSPEs is eliminated, what adjustment, if any, would be *most* appropriate?
- A. Reverse the transfer and treat the proceeds received as equity.
  - B. Reverse the transfer and treat the proceeds received as debt.
  - C. No adjustment would be necessary.
10. Bledsoe Corporation is the lessee in a non-cancelable operating lease. Which of the following *best* describes the effect of adjusting Bledsoe's financial statements for analytical purposes?
- A. The current ratio would increase.
  - B. The debt-to-equity ratio would decrease.
  - C. Operating profit would increase.

## ANSWERS – CONCEPT CHECKERS

1. **C** Common-size financial statements are created in the data processing step of the framework for financial analysis.
2. **C** Communication with management, suppliers, customers, and competitors is an input during the data collection step.
3. **A**  $\text{ROE} = \text{tax burden} \times \text{interest burden} \times \text{EBIT margin} \times \text{asset turnover} \times \text{financial leverage}$   
 $= (1 - 0.35) \times 0.70 \times 0.11 \times 1.2 \times 1.5 = 0.09$   
  
 $\text{tax burden} = \text{net income} / \text{earnings before tax} = 1 - \text{tax rate}$
4. **B**  $(158,650 \text{ net income} - 16,750 \text{ equity income}) / 236,500 \text{ EBT} = 60.0\%$
5. **B**  $848,000 \text{ revenue} / [(2009 \text{ total assets of } 468,000 - 2009 \text{ Creston investment of } 56,400 + 2008 \text{ total assets of } 363,600 - 2008 \text{ Creston investment of } 42,100) / 2] = 848,000 / 366,550 = 2.31$
6. **A** Rainbow may be overallocating resources to Red because Red has the lowest EBIT margin and a ratio of proportional capital expenditures to proportional assets that is greater than 1 ( $70\% / 40\% = 1.75$ ). Green has highest EBIT margin and a ratio of proportional capital expenditures to proportional assets that is less than 1 ( $30\% / 60\% = 0.50$ ).
7. **B**  $\text{Pro-rata share of Small's market cap} / \text{Big's market cap} = (\text{€}150,000 \times 25\% \times 0.85) / \text{£}275,000 = 11.6\%$ .
8. **B** Big's implied value without Small is £243,125, or £275,000 Big market cap – £31,875 pro-rata share of Small market cap ( $\text{€}150,000 \times 25\% \times 0.85$  current exchange rate).  
  
 Big's net income without Small is £14,800, or £16,000 Big net income – £1,200 pro-rata share of Small net income ( $\text{€}6,000 \times 25\% \times 0.80$  average exchange rate).  
  
 $\text{Implied P/E} = 16.4 (\text{£}243,125 \text{ Big's implied value without Small} / \text{£}14,800 \text{ Big's net income without Small})$ .
9. **B** The most appropriate treatment would be to reverse the transfer and treat the cash received as debt. The result would be an increase in assets and an increase in liabilities.
10. **C** When adjusting the income statement for an operating lease, the rent expense is added back to operating income and depreciation expense on the lease asset is subtracted. The rental payment will likely exceed the implied depreciation expense; thus, operating income will increase. Interest expense will also be increased by interest on the lease liability, but this will not affect operating income. The D/E ratio will increase. The current ratio will decrease because the current portion of the lease liability will increase current liabilities.

## SELF-TEST: FINANCIAL REPORTING AND ANALYSIS

Use the following information to answer Questions 1 through 6.

Gotham Pharmaceuticals wants to increase its sales growth, which has sagged in recent quarters, by increasing its research and development budget and by purchasing a smaller company that lacks the resources to market its groundbreaking osteoporosis treatment. Operating cash flow alone will not provide the cash Gotham wants to spend, so the company has decided to sell some of its assets.

Below is a list of Gotham's financial assets, most of which the company has owned for a decade or more. Assume that U.S. GAAP applies.

<i>Securities</i>	<i>Carrying Value at End of Most Recent Fiscal Year</i>	<i>Estimated Market Value Six Months Into Current Year</i>
Corporate Bonds 6.25%	\$75,000,000	\$74,000,000
Treasury Bonds 6.75%	\$125,000,000	\$128,000,000
S&P 500 Index Fund	\$35,000,000	\$41,000,000
General Electric Preferred Stock	\$13,000,000	\$12,500,000
Package of Residential Mortgages	\$42,000,000	\$43,000,000

Frank Caper, Gotham's CFO, is unsure how to approach the security sales, so he assigns Julia Ward, director of the company's accounting division, to handle the recordkeeping. When Ward asks Caper which securities he plans to sell, Caper responds that he has not yet decided, but he expects the purchase of the smaller drug company will require between \$190 million and \$240 million.

Ward begins her review of Gotham's securities holdings and learns the following:

- The corporate bonds are classified as held-to-maturity.
- The preferred stock is classified as a trading security.
- The Treasury bonds, package of mortgages, and index fund are classified as available-for-sale.

A review of the balance sheet left Ward with several questions. She called Caper for clarification, who made the following statements:

- The fact is that, up until this point, we never had any real intent with regard to selling these securities.
- The package of mortgages is carried at cost because such securities are not commonly traded and no market value is available.
- We know the market price for the corporate bonds but record their value at cost anyway.
- We intend to reclassify the Treasury bonds as trading securities because they mature in less than a year.
- Because the index fund has the most appreciation potential, we intend to reclassify it as held-to-maturity.

Confused by Caper's statements, Ward tries a new tactic and looks at the securities from an income-statement perspective. She prepares a table showing how the securities have performed over the last year and then reviews the income statement and balance sheet for the year to see how Gotham handled the accounting.

<i>Securities</i>	<i>Dividends/Interest, Last Fiscal Year</i>	<i>Unrealized Gains/Losses, Last Fiscal Year</i>	<i>Realized Gains/Losses, Last Fiscal Year</i>
Corporate Bonds 6.25%	\$4,500,000	\$2,500,000	
Treasury Bonds 6.75%	\$8,500,000	−\$6,000,000	
S&P 500 Index Fund	\$630,000	\$4,000,000	\$500,000
General Electric Preferred Stock	\$740,000	\$1,200,000	
Package of Residential Mortgages	\$2,200,000	−\$3,600,000	\$3,000,000

After reviewing Gotham's accounting for its securities, Ward realizes she does not have enough information to recommend reclassification for the securities.

While preparing to call Caper for more information, Ward comes across one additional investment not included in the original list. Gotham owns 35% of the Klesten Research Center, a laboratory that provides preclinical testing services. That stake is not represented on the income statement or balance sheet. Last year, Klesten Research Center lost \$150 million, increased its debt load by \$400 million to \$2.1 billion, saw its market value fall by \$100 million to \$4.85 billion, and paid \$40 million in dividends.

- The effect of Gotham's investment portfolio on reported net income in the last fiscal year was *closest* to a gain of:
  - \$18,170,000.
  - \$19,270,000.
  - \$21,270,000.
- Under Gotham's current accounting system, which of the following securities are *least accurately* classified?
  - Preferred stock.
  - Package of mortgages.
  - Corporate bonds.
- Caper has not provided enough information for Ward to reclassify the securities. She needs more details regarding:
  - when the securities were originally purchased.
  - how much Gotham intends to spend on the purchase.
  - which securities Gotham plans to sell to raise the money.

4. Gotham, which purchased 35% of Klesten Research Center in 2005, restates the last three years of financial statements to account for the purchase. Gotham has not elected the fair value option. In the fiscal year ended December 2008, what is the *most likely* effect the Klesten investment would have on Gotham's financial statements?
  - A. Decrease income and assets.
  - B. Increase income and assets.
  - C. Decrease income and increase assets.
5. Which of Caper's statements reflects the *best* understanding of security classification?
  - A. The package of mortgages is carried at cost because such securities are not commonly traded, and no market value is available.
  - B. We know the market price for the corporate bonds but record their value at cost anyway.
  - C. We intend to reclassify the Treasury bonds as trading securities because they mature in less than a year.
6. After reviewing Gotham's financial statements and reconsidering Caper's statements, Ward will *most likely* conclude that the proposed reclassification of the S&P 500 index fund:
  - A. is correct and will reduce ROE.
  - B. is incorrect because it cannot be classified as held-to-maturity.
  - C. will only be correct if Gotham can prove that it has the capability as well as the intent to hold-to-maturity.

Use the following information to answer Questions 7 through 12.

James Reed, CFA, a health care analyst for the Jacobs Independent Advisors Group (JIAG), is conducting a review of Two Bear Pharmaceutical, Inc. (Two Bear).

Reed reviews his initial report on Two Bear with Krista Reynolds, a Level 1 CFA candidate. During their discussion, Reynolds tells Reed that she is unclear about the basic characteristics of a defined benefit versus a defined contribution pension plan. Reed proceeds to discuss the pros and cons of defined benefit plans and defined contribution pension plans with Reynolds.

Reed and Reynolds continue their discussion by looking at Two Bear's defined-benefit pension plan. Specifically, they review Two Bear's selection of discount rate, rate of compensation growth, and expected return on plan assets.

Reed enlists Reynolds's assistance in comparing and contrasting Two Bear's pension and other post-retirement health plan assumptions over the past few years and across similar pharmaceutical firms. Reynolds gathers historical and competitive data and has questions about the ultimate health care trend rate as well as the internal consistency of Two Bear's post-retirement benefit assumptions. Reynolds notes that Two Bear has replaced the compensation growth rate with a health care inflation rate. Later, she asks Reed what the assumptions underlying the estimate of the health care inflation rate are.

As part of his analysis of Two Bear's defined benefit pension plan, Reed would like to estimate the underlying economic liability (or asset) of the plan and prepare an adjusted income statement. Reed gathers the following data:

(\$ in thousands)		Unadjusted Income Statement Items	
Beginning pension obligation	\$4,545	Operating profit	\$25,000
Beginning plan assets	\$4,327	Interest expense	(\$1,300)
		Other income	\$350
Service costs	\$404	Income before taxes	\$24,050
Interest costs	\$275		
Amortization of actuarial loss	\$42		
Benefits paid	\$560		
Expected return on plan assets	\$200		
Actual return on plan assets	\$176		
Contributions to plan	\$895		

While reading through the annual reports for Two Bear, Reynolds notes that Two Bear has a share-based compensation plan in place. Being unaware of the accounting treatment of share-based compensation plans, Reynolds consults with Reed as to how they are treated.

7. In responding to Reynolds's question about the characteristics of a defined benefit pension plan, Reed would have *most accurately* told her that in a defined benefit plan:
  - A. the employee's actual benefit will depend on the future value of the pension plan's assets.
  - B. the amount of the future obligation is based on a plan formula and must be estimated in the current period.
  - C. a firm's accumulated benefit obligation (ABO) is the actuarial present value of all future benefits earned to date based on present salary levels and an estimate of future salary growth.
8. In explaining the compensation growth rate to Reynolds, Reed would have *most accurately* told her that reducing the compensation growth rate will:
  - A. increase pension expense.
  - B. result in lower future pension payments, lower current service cost, and lower interest cost.
  - C. reduce future pension payments, and the projected benefit obligation (PBO) will be higher.
9. What is the typical assumption regarding the ultimate health care trend rate?
  - A. Inflation rate in health care costs will taper off to zero long term.
  - B. Inflation rate in health care costs will decline over time to a lower, constant rate sometime in the future.
  - C. Expected growth in health care costs causes the ultimate health care trend rate to increase over time and then become constant.



10. The underlying economic liability or asset of Two Bear's defined benefit pension fund for the end of period is *closest* to a(n):
  - A. asset of \$132.
  - B. asset of \$174.
  - C. liability of \$218.
11. After reclassifying operating and non-operating pension items appropriately, the adjusted income before tax is *closest* to:
  - A. \$23,775.
  - B. \$24,068.
  - C. \$24,301.
12. The proper accounting treatment for the issuance and eventual exercise of employee stock options on 1,000 shares at €15, granted and immediately vested on September 25, 2009, when the market value of the shares is €18, and exercised on September 25, 2012, when the market value of the shares is €27, is to:
  - A. record no expense at the grant date and record an expense of €9,000 at the exercise date.
  - B. record an expense on the grant date equal to the options' value based on a model of option pricing.
  - C. spread the expense for the options, equal to their option pricing model value on the grant date over the 3-year period.

## SELF-TEST ANSWERS: FINANCIAL REPORTING AND ANALYSIS

1. **C** To calculate the reported net income effect, we begin by looking at how each security is classified. The corporate bonds are classified as held-to-maturity; preferred stock is a trading security; the Treasury bonds, package of mortgages, and index fund are classified as available-for-sale. For trading securities, dividends, interest, and both realized and unrealized losses count toward income. For securities classified held-to-maturity or available-for-sale, only dividends, interest, and realized gains count toward income.

<i>Securities</i>	<i>Dividends/Interest</i>	<i>Unrealized Gains/Losses</i>	<i>Realized Gains / Losses</i>	<i>Accounting</i>	<i>Income Effect</i>
Corporate Bonds 6.25%	\$4,500,000	\$2,500,000		Held-to- Maturity	\$4,500,000
Treasury Bonds 6.75%	\$8,500,000	−\$6,000,000		Available- -for-Sale	\$8,500,000
S&P 500 Index Fund	\$630,000	\$4,000,000	\$500,000	Available- -for-Sale	\$1,130,000
General Electric Preferred Stock	\$740,000	\$1,200,000		Trading	\$1,940,000
Package of Residen- tial Mortgages	\$2,200,000	−\$3,600,000	\$3,000,000	Available- -for-Sale	\$5,200,000
Total					\$21,270,000

2. **A** There is nothing wrong with how Gotham classifies the bonds and mortgages, as the available-for-sale classification leaves plenty of flexibility. However, until recently, Gotham appeared to have no intention of selling securities. As such, no investments should have been classified as a trading security.
3. **C** Ward must know which securities Gotham will sell so she can correctly classify the securities. The purchase date of the securities is irrelevant, and even if Ward knew how much Gotham intended to spend, it would not tell her which securities to reclassify. Return potential may have an effect on which securities the company chooses to sell, but that return information will not help Ward change the accounting policy.
4. **A** The equity method appears to be the best way to account for Gotham's 35% stake in Klesten Research Center. Under the equity method, the proportional share of Klesten's operational loss is included in Gotham's income, which will decrease Gotham's total income. This decrease would also reduce the carrying value of the Klesten stake on the balance sheet, and the dividend would reduce it still further. Market value is irrelevant in this case, as is the increase in Klesten's debt level.

5. **B** Securities held-to-maturity, like the corporate bonds, are supposed to be carried at cost on the balance sheet even if a market price is available. The remaining statements reflect a lack of understanding. The mortgages are classified as available-for-sale and must be carried at market value. Gotham must either determine a market value for them or classify them as held-to-maturity. The maturity of a bond has nothing to do with its classification. Furthermore, the classification of a trading security has to do with intent to sell, not marketability.
6. **B** The S&P 500 Index Fund is an equity security, and equity securities cannot be held to maturity (they do not have a stated maturity).
7. **B** In a defined benefit pension plan, the amount of the future obligation is based on a plan formula and has to be estimated in the current period. A *defined contribution* plan is dependent on the future value of the pension plan's assets. Under a defined benefit plan, one of the measures of the pension obligation under U.S. GAAP is the accumulated benefit obligation (ABO), which is the actuarial present value of all future pension benefits earned to date based on current salary levels, but it does not take into account future salary growth.
8. **B** Reducing the compensation growth rate will reduce estimated future pension payments, thus reducing the projected benefit obligation (PBO) and improving the funded status of the plan. In addition, reducing the compensation growth rate will reduce current service cost, interest cost, and pension expense.
9. **B** The broadly held assumption is that health care costs, over time, will taper off to a lower, constant rate. This future inflation rate is defined as the ultimate health care trend rate.
10. **A** The economic asset for Two Bear is \$132, calculated as follows:

<i>(\$ in thousands)</i>	<i>Beginning</i>	<i>Economic Expense</i>		<i>Benefits Paid/ Contributions</i>		<i>End of Period</i>
Pension obligation	\$4,545					\$4,706
		Service costs	\$404	Benefits paid	−\$560	
		Interest costs	\$275			
		Amortization of actuarial loss	\$42			
		<b>Total</b>	<b>\$721</b>			
Plan assets	\$4,327					\$4,838
		Actual return	\$176	Contributions to plan	\$895	
				Benefits paid	−\$560	
				<b>Total</b>	<b>\$335</b>	
Net funded position	−\$218			Economic asset (liability)		\$132

11. **B** The adjusted income before tax is \$24,026, calculated as follows:

	<i>Unadjusted</i>	<i>Adjustments</i>	<i>Adjusted</i>
Operating profit	\$25,000	$(\$404 + \$275 + \$42 - \$200) - \$404 = +117$	\$25,117
Interest expense	-\$1,300	-\$275	-\$1,575
Other income	\$350	+\$176	\$526
Income before taxes	\$24,050		<b>\$24,068</b>

The adjustment to operating profit is to add back reported pension expense [calculated as service costs (\$404) plus interest cost (\$275) plus amortization of actuarial loss (\$42), less expected return on assets (\$200)], then subtract current service cost (\$404). The adjustment to interest expense is to add interest cost (\$275). The adjustment to other income is to add actual return on plan assets (\$176).

12. **B** Under both U.S. GAAP and IFRS, the option expense for options that are fully vested on the grant date is equal to the value of the options using some option valuation model and is recorded on the grant date.

# CAPITAL BUDGETING

Study Session 8

## EXAM FOCUS

This topic review covers various methods for evaluating capital projects and builds on the net present value (NPV) decision criterion that you learned at Level 1. The first thing you need to know is that the relevant cash flows for evaluating a capital project are the incremental after-tax cash flows. Pay special attention to after-tax salvage value and the impact that depreciation has on determining cash flow. Once you have the cash flows down, it should be relatively easy to discount those cash flows and apply the proper NPV analysis for an expansion or replacement project, or decide between two mutually exclusive projects with different lives. Another concept to know is how various real options give managers flexibility with capital budgeting projects. Even if you are unsure how to handle the calculation of NPV involving real options, remember that the existence of options will always increase NPV. Finally, familiarize yourself with alternative concepts of calculating income, including economic income, economic profit, residual income, and claims analysis, and pay attention to the proper discount rate under each method. You'll see these concepts later in the equity valuation material in Study Session 12.

## WARM-UP: BASICS OF CAPITAL BUDGETING

The **capital budgeting process** is the process of identifying and evaluating capital projects; that is, projects where the cash flow to the firm will be received over a period longer than a year. Any corporate decisions with an impact on future earnings can be examined using this framework. Decisions about whether to buy a new machine, expand business in another geographic area, move the corporate headquarters to Cleveland, or replace a delivery truck, to name a few, can be examined using a capital budgeting analysis.

### Categories of Capital Budgeting Projects

Capital budgeting projects may be divided into the following categories:

- *Replacement projects to maintain the business* are normally made without detailed analysis. The only issues are whether the existing operations should continue and, if so, whether existing procedures or processes should be maintained.
- *Replacement projects for cost reduction* determine whether equipment that is obsolete, but still usable, should be replaced. A fairly detailed analysis is necessary in this case.
- *Expansion projects* are taken on to expand the business and involve a complex decision-making process since they require an explicit forecast of future demand. A very detailed analysis is required.
- *New product or market development* also entails a complex decision-making process that will require a detailed analysis due to the large amount of uncertainty involved.

- *Mandatory projects* may be required by a governmental agency or insurance company and typically involve safety-related or environmental concerns. These projects typically generate little to no revenue, but they accompany new revenue-producing projects undertaken by the company.
- *Other projects*. Some projects are not easily analyzed through the capital budgeting process. Such projects may include a pet project of senior management (e.g., corporate perks), or a high-risk endeavor that is difficult to analyze with typical capital budgeting assessment methods (e.g., research and development projects).

## Principles of Capital Budgeting

The capital budgeting process involves five key principles:

1. *Decisions are based on cash flows, not accounting income.* The relevant cash flows to consider as part of the capital budgeting process are **incremental cash flows**, the changes in cash flows that will occur if the project is undertaken.

**Sunk costs** are costs that cannot be avoided, even if the project is not undertaken. Since these costs are not affected by the accept/reject decision, they should not be included in the analysis. An example of a sunk cost is a consulting fee paid to a marketing research firm to estimate demand for a new product prior to a decision on the project.

**Externalities** are the effects the acceptance of a project may have on other firm cash flows. The primary one is a negative externality called **cannibalization**, which occurs when a new project takes sales from an existing product. When considering externalities, the full implication of the new project (loss in sales of existing products) should be taken into account. An example of cannibalization is when a soft drink company introduces a diet version of an existing beverage. The analyst should subtract the lost sales of the existing beverage from the expected new sales of the diet version when estimating incremental project cash flows. A positive externality exists when doing the project would have a positive effect on sales of a firm's other project lines.

2. *Cash flows are based on opportunity costs.* **Opportunity costs** are cash flows that a firm will lose by undertaking the project under analysis. These are cash flows generated by an asset the firm already owns that would be forgone if the project under consideration is undertaken. Opportunity costs should be included in project costs. For example, when building a plant, even if the firm already owns the land, the cost of the land should be charged to the project since it could be sold or rented to an outside party if not used.
3. *The timing of cash flows is important.* Capital budgeting decisions account for the time value of money, which means that cash flows received earlier are worth more than cash flows to be received later.
4. *Cash flows are analyzed on an after-tax basis.* The impact of taxes must be considered when analyzing all capital budgeting projects. Firm value is based on cash flows they get to keep, not those they send to the government.

5. *Financing costs are reflected in the project's required rate of return.* The required rate of return is a function of its risk. Ordinarily, the level of risk is measured relative to the firm's overall risk and the required return relative to the firm's cost of capital. Only projects that are expected to return more than the cost of the capital needed to fund them will increase the value of the firm.

### Modified Accelerated Cost Recovery System (MACRS)

The choice of depreciation method has important implications for the after-tax cash flows of a capital project. Most countries specify which depreciation methods are acceptable to use for tax purposes. In the United States, most companies use straight-line depreciation for financial reporting and the **modified accelerated cost recovery system** (MACRS) for tax purposes. For capital budgeting purposes, we should use the same depreciation method used for tax reporting since capital budgeting analysis is based on after-tax cash flows and not accounting income.

Under MACRS, assets are classified into 3-, 5-, 7-, or 10-year classes, and each year's depreciation is determined by the applicable recovery percentage given in Figure 1.

**Figure 1: Recovery Allowance Percentage for Personal Property**

Ownership Year	Class of Investment			
	<u>3-Year</u>	<u>5-Year</u>	<u>7-Year</u>	<u>10-Year</u>
1	33%	20%	14%	10%
2	45	32	25	18
3	15	19	17	14
4	7	12	13	12
5		11	9	9
6		6	9	7
7			9	7
8			4	7
9				7
10				6
11				3
	100%	100%	100%	100%

Buildings are 39-year assets: 1.3% in years 1 and 40 and  $100 / 39 = 2.6\%$  in the other years.



*Professor's Note: You do not have to memorize the MACRS tables, but you should be prepared to use MACRS or any other accelerated depreciation method if you need to compute incremental cash flows for a capital budgeting project.*

The **half-year convention** under MACRS assumes that the asset is placed in service in the middle of the first year. The effect of this is to extend the recovery period of a 3-year class asset to four calendar years (33%, 45%, 15%, 7%) and a 5-year asset to six calendar years (20%, 32%, 19%, 12%, 11%, 6%).

The **depreciable basis** is equal to the purchase price plus any shipping or handling and installation costs. The basis is not adjusted for salvage value regardless of whether the accelerated or straight-line method is used.

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**LOS 29.a: Compute the yearly cash flows of an expansion capital project and a replacement capital project and evaluate how the choice of depreciation method affects those cash flows.**

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Generally, we can classify incremental cash flows for capital projects as (1) initial investment outlay, (2) operating cash flow over the project's life, and (3) terminal-year cash flow.

- **Initial investment outlay** is the up-front costs associated with the project. Components are price, which includes shipping and installation (FCInv) and **investment in net working capital** (NWCInv).

$$\text{outlay} = \text{FCInv} + \text{NWCInv}$$

The investment in NWC must be included in the capital budgeting decision. Whenever a firm undertakes a new operation, product, or service, additional inventories are usually needed to support increased sales, and the increased additional sales lead to increases in accounts receivable. Accounts payable and accruals will probably also increase proportionally.

The investment in net working capital is defined as the difference between the changes in non-cash current assets and changes in non-cash current liabilities (i.e., those other than short-term debt). Cash is excluded because it is generally assumed not to be an operating asset.

$$\text{NWCInv} = \Delta \text{non-cash current assets} - \Delta \text{non-debt current liabilities} = \Delta \text{NWC}$$

If NWCInv is *positive*, additional financing is required and represents a cash outflow because cash must be used to fund the net investment in current assets. (If negative, the project frees up cash, creating a cash inflow.) Note that at the termination of the project, the firm will expect to receive an end-of-project cash inflow (or outflow) equal to initial NWC when the need for the additional working capital ends.



- **After-tax operating cash flows (CF)** are the incremental cash inflows over the capital asset's economic life. Operating cash flows are defined as:

$$\begin{aligned} CF &= (S - C - D)(1 - T) + D \\ &= (S - C)(1 - T) + (TD) \end{aligned}$$

where:

S = sales

C = cash operating costs

D = depreciation expense

T = marginal tax rate

Although **depreciation** is a non-cash operating expense, it is an important part of determining operating cash flow because it reduces the amount of taxes paid by the firm. We can account for depreciation either by adding it back to net income from the project (as in the first cash flow formula) or by adding the tax savings caused by depreciation back to the project's after-tax gross profit (as in the second formula). In general, a higher depreciation expense will result in greater tax savings and higher cash flows. This means that accelerated depreciation methods will create higher after-tax cash flows for the project earlier in the project's life as compared to the straight-line method, resulting in a higher net present value (NPV) for the project.



*Professor's Note: Interest is not included in operating cash flows for capital budgeting purposes because it is incorporated into the project's cost of capital.*

- **Terminal year after-tax non-operating cash flows (TNOCF).** At the end of the asset's life, there are certain cash inflows that occur. These are the after-tax salvage value and the return of the net working capital.

$$TNOCF = Sal_T + NWCInv - T(Sal_T - B_T)$$

where:

Sal<sub>T</sub> = pre-tax cash proceeds from sale of fixed capital

B<sub>T</sub> = book value of the fixed capital sold



*Professor's Note: The notation for this formula is somewhat confusing because "T" is used in two different ways: (1) as the marginal tax rate and (2) as a time subscript indicating year T, the final year of the project. If "T" shows up in a formula, assume it refers to the marginal tax rate unless it is subscripted.*

## Expansion Project Analysis

An expansion project is an investment in a new asset to increase both the size and earnings of a business.

### Example: Expansion project analysis

Mayco, Inc. would like to set up a new plant (expand). Currently, Mayco has an option to buy an existing building at a cost of \$24,000. Necessary equipment for the plant will cost \$16,000, including installation costs. The equipment falls into a MACRS 5-year class. The building falls into a MACRS 39-year class. The project would also require an initial investment of \$12,000 in net working capital. The initial working capital investment will be made at the time of the purchase of the building and equipment.

The project's estimated economic life is four years. At the end of that time, the building is expected to have a market value of \$15,000 and a book value of \$21,816, whereas the equipment is expected to have a market value of \$4,000 and a book value of \$2,720.

Annual sales will be \$80,000. The production department has estimated that variable manufacturing costs will total 60% of sales and that fixed overhead costs, excluding depreciation, will be \$10,000 a year [costs:  $(0.60)80,000 + 10,000 = 58,000$ ]. Depreciation expense will be determined for the year in accordance with the MACRS rate.

Mayco's marginal federal-plus-state tax rate is 40%; its cost of capital is 12%; and, for capital budgeting purposes, the company's policy is to assume that operating cash flows occur at the end of each year. The plant will begin operations immediately after the investment is made, and the first operating cash flows will occur exactly one year later.

Under MACRS, the pre-tax depreciation for the building and equipment is:

Year 1 = \$3,512; Year 2 = \$5,744; Year 3 = \$3,664; Year 4 = \$2,544

Compute the initial investment outlay, operating cash flow over the project's life, and the terminal-year cash flows for Mayco's expansion project. Then determine whether the project should be accepted using NPV analysis.

**Answer:**

*Initial outlay:*

$$\begin{aligned}\text{initial outlay} &= \text{price of building} + \text{price of equipment} + \text{NWCInv} \\ &= \$24,000 + \$16,000 + \$12,000 = \$52,000\end{aligned}$$

*Operating cash flows:*

$$\begin{aligned}\text{CF} &= (S - C)(1 - T) + DT \\ \text{CF}_1 &= [(\$80,000 - 58,000)(0.6)] + (3,512)(0.4) = \$14,605 \\ \text{CF}_2 &= 13,200 + (5,744)(0.4) = \$15,498 \\ \text{CF}_3 &= 13,200 + (3,664)(0.4) = \$14,666 \\ \text{CF}_4 &= 13,200 + (2,544)(0.4) = \$14,218\end{aligned}$$

*Terminal year after-tax non-operating cash flows:*

There are two elements to the terminal year cash flow (TNOCF): (1) return of net working capital and (2) salvage value of both the building and the equipment.

First calculate the after-tax terminal cash flows associated with the building and the equipment separately:

$$\text{CF for building} = \$15,000 - 0.4(\$15,000 - \$21,816) = \$17,726$$

$$\text{CF for equipment} = \$4,000 - 0.4(\$4,000 - \$2,720) = \$3,488$$

Then include the return of NWCInv:

$$\text{TNOCF} = \$17,726 + \$3,488 + \$12,000 = \$33,214$$

Note in this example the investment in NWC was positive (a use of cash resulting in a cash outflow), so the terminal value effect will be a cash inflow. Had the project freed up working capital, the initial investment in NWC would be negative (a cash inflow) and the terminal value effect would be a cash outflow. Also notice that the building was sold for less than book value. The loss on the building reduces taxes and results in a positive incremental cash flow equal to the tax savings.

Using the expansion project's relevant after-tax cash flows and given that Mayco has a cost of capital of 12%, the NPV for the project can be computed as:

$$\text{NPV} = -52,000 + \frac{\$14,605}{1.12^1} + \frac{\$15,498}{1.12^2} + \frac{\$14,666}{1.12^3} + \frac{\$14,218}{1.12^4} + \frac{\$33,214}{1.12^4} = \$13,978$$

$$\text{IRR (from financial calculator)} = 21.9\%$$

**Decision:** Since  $\text{NPV} > 0$  and the  $\text{IRR} > 12\%$ , Mayco should accept the expansion project.



*Professor's Note: Remember that you can use your calculator to quickly calculate NPV and IRR using the time value functions.*

### Other Presentation Formats

There are two other formats for presenting the analysis of a capital budgeting project with which you should be familiar: (1) table format with cash flows collected by year, and (2) table format with cash flows collected by type. Be prepared to analyze a project when the cash flows are presented in either of these formats on the exam.

Figure 2 presents the analysis of the Mayco capital budgeting project with cash flows collected by year.

**Figure 2: Mayco Project: Cash Flows Collected by Year**

Year	0	1	2	3	4
<i>Initial outlay:</i>					
FCInv	– \$40,000				
WCInv	– \$12,000				
	– \$52,000				
<i>After-tax operating CFs:</i>					
Sales		\$80,000	\$80,000	\$80,000	\$80,000
Cash operating expenses		58,000	58,000	58,000	58,000
Depreciation		<u>3,512</u>	<u>5,744</u>	<u>3,664</u>	<u>2,544</u>
Oper. income before taxes		18,488	16,256	18,336	19,456
Taxes on oper. income		<u>7,395</u>	<u>6,502</u>	<u>7,334</u>	<u>7,782</u>
Oper. income after taxes		11,093	9,754	11,002	11,674
Add back: depreciation		<u>3,512</u>	<u>5,744</u>	<u>3,664</u>	<u>2,544</u>
After tax oper. CF		14,605	15,498	14,666	14,218
<i>Terminal year after-tax non-oper. CF (TNOCF)</i>					
After-tax salvage value					21,214
Return of NWC					12,000
TNOCF					33,214
Total after-tax CF	–\$52,000	\$14,605	\$15,498	\$14,666	\$47,432
NPV(12%)	\$13,978				
IRR	21.9%				

Figure 3 presents the analysis of the Mayco capital budgeting project with cash flows collected by type.

**Figure 3: Mayco Project: Cash Flows Collected by Type**

<i>Time</i>	<i>Type of CF</i>	<i>Before-tax CF</i>	<i>After-tax CF</i>	<i>PV at 12%</i>
0	FCInv	–\$40,000	–\$40,000	–\$40,000
0	NWCInv	–12,000	–12,000	–12,000
1 – 4	Sales – cash expenses	22,000	$22,000 (1 - 0.4) = 13,200$	40,093
1	Depreciation tax savings*	None	$3,512 (0.4) = 1,405$	1,255
2	Depreciation tax savings*	None	$5,744(0.4) = 2,298$	1,832
3	Depreciation tax savings*	None	$3,664(0.4) = 1,466$	1,043
4	Depreciation tax savings*	None	$2,544(0.4) = 1,018$	647
4	After-tax salvage value	$19,000 = 15,000 + 4,000$	21,214 (from Figure 2)	13,482
4	Return of NWCInv	12,000	12,000	<u>7,626</u>
				<b>NPV = \$13,978</b>

\* Note that if straight-line depreciation is used, the depreciation tax savings is an annuity and you can calculate the present value of that annuity directly, rather than summing the present values of the individual depreciation tax savings for each year.

### Replacement Project Analysis

Replacement project analysis occurs when a firm must decide whether to replace an existing asset with a newer or better asset. There are two key differences in the analysis of a replacement project versus an expansion project. In a replacement project analysis we have to:

1. Reflect the sale of the old asset in the calculation of the initial outlay:

$$\text{outlay} = \text{FCInv} + \text{NWCInv} - \text{Sal}_0 + T (\text{Sal}_0 - B_0)$$

2. Calculate the incremental operating cash flows as the cash flows from the new asset minus the cash flows from the old asset:

$$\Delta \text{CF} = (\Delta S - \Delta C)(1 - T) + \Delta \text{DT}$$

**Example: Replacement project analysis**

Suppose Mayco wants to replace an existing printer with a new high-speed copier. The existing printer was purchased ten years ago at a cost of \$15,000. The printer is being depreciated using straight line basis assuming a useful life of 15 years and no salvage value (i.e., its annual depreciation is \$1,000). Currently, the printer has a net book value of \$5,000.

The new high-speed copier can be purchased for \$24,000 (including freight and installation). Over its 5-year life, it will reduce labor and raw materials usage sufficiently to cut annual operating costs from \$14,000 to \$8,000. This reduction in costs will cause before-tax profits to rise by  $\$14,000 - \$8,000 = \$6,000$  per year.

It is estimated that the new copier can be sold for \$4,000 at the end of five years; this is its estimated salvage value. The old printer's current market value is \$2,000, which is below its \$5,000 book value. If the new copier is acquired, the old printer will be sold to another company.

The company's marginal federal-plus-state tax rate is 40%, and the replacement copier is of slightly below-average risk. Net working capital requirements will also increase by \$3,000 at the time of replacement. By an IRS ruling, the new copier falls into the 3-year MACRS class. The project's cost of capital is set at 11.5%.

Under the MACRS system, the pre-tax depreciation for the equipment is:

$$\text{Year 1} = \$7,920; \text{Year 2} = \$10,800; \text{Year 3} = \$3,600; \text{Year 4} = \$1,680; \text{Year 5} = \$0$$

Compute the initial investment outlay, operating cash flow over the project's life, and the terminal-year cash flows for Mayco's replacement project. Then determine whether the project should be accepted using NPV analysis.

**Answer:**

*Initial investment outlay:*

$$\begin{aligned} \text{initial outlay} &= \$24,000 + \$3,000 - \$2,000 + 0.4 (\$2,000 - \$5,000) \\ &= \$23,800 \end{aligned}$$

*Operating cash flows:*

$$CF_t = [(\Delta S - \Delta C)(1 - T)] + \Delta DT$$

$$\Delta S = 0$$

$$\Delta C = -6,000$$

$$\Delta DT = (\text{MACRSD} - 1,000)(0.4)$$

$$CF_1 = [0 - (-6,000)](1 - 0.4) + (7,920 - 1,000)(0.4) = \$6,368$$

$$CF_2 = [0 - (-6,000)](1 - 0.4) + (10,800 - 1,000)(0.4) = \$7,520$$

$$CF_3 = [0 - (-6,000)](1 - 0.4) + (3,600 - 1,000)(0.4) = \$4,640$$

$$CF_4 = [0 - (-6,000)](1 - 0.4) + (1,680 - 1,000)(0.4) = \$3,872$$

$$CF_5 = [0 - (-6,000)](1 - 0.4) + (0 - 1,000)(0.4) = \$3,200$$



*Professor's Note: When calculating depreciation, we need to decrease the new printer depreciation expense by the depreciation that would have occurred with the old printer, which was \$1,000 per year.*

*Terminal year flow:*

$$\text{TNOCF} = 4,000 + 3,000 - 0.4(4,000 - 0) = \$5,400$$

Given Mayco's incremental cash flows and a cost of capital of 11.5%, net present value (NPV) for the project can be computed as:

$$\begin{aligned} \text{NPV} &= -23,800 + \frac{6,368}{1.115^1} + \frac{7,520}{1.115^2} + \frac{4,640}{1.115^3} + \frac{3,872}{1.115^4} + \frac{3,200 + 5,400}{1.115^5} \\ &= -\$1,197.28 \end{aligned}$$

$$\text{IRR} = 9.46\%$$

*Decision:* Since the NPV is negative and the IRR is less than the cost of capital, Mayco should not replace the printer with the new copier.

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### LOS 29.b: Discuss the effects of inflation on capital budgeting analysis.

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Inflation is a complication that must be considered as part of the capital budgeting process.

- **Analyzing nominal or real cash flows.** Nominal cash flows reflect the impact of inflation, while real cash flows are adjusted downward to remove inflation effects. Although either type of cash flow can be used in the capital budgeting process, it is important to match the type of cash flows with the discount rate. Nominal cash flows should be discounted at a nominal discount rate, while real cash flows should be discounted at a real discount rate.
- **Changes in inflation affect project profitability.** If inflation is higher than expected, future project cash flows are worth less, and the value of the project will be lower than expected. The opposite is also true, however. If inflation turns out to be lower than originally expected, future cash flows from the project will be worth more, effectively increasing the project's value.
- **Inflation reduces the tax savings from depreciation.** If inflation is higher than expected, the firm's real taxes paid to the government are effectively increased because the depreciation tax shelter is less valuable. This is because the depreciation charge, which is based upon the asset's purchase price, is less than it would be if recalculated at current (i.e., inflated) prices.
- **Inflation decreases the value of payments to bondholders.** Bondholders receive fixed payments that are effectively worth less as inflation increases. This means that higher than expected inflation effectively shifts wealth to issuing firms at bondholders' expense.
- **Inflation may affect revenues and costs differently.** If prices of goods change at a different rate than the prices for inputs used to create those goods, the firm's after-tax cash flows may be better or worse than expected.



*Professor's Note: See the topic review of valuation in emerging markets in Study Session 11 for more detail on analyzing the effects of inflation on the capital budgeting process.*

**LOS 29.c: Evaluate and select the optimal capital project in situations of 1) mutually exclusive projects with unequal lives, using either the least common multiple of lives approach or the equivalent annual annuity approach, and 2) capital rationing.**

### Mutually Exclusive Projects with Different Lives

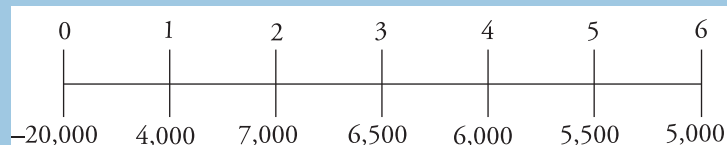
When two projects are *mutually exclusive*, the firm may choose one project or the other, but not both. If mutually exclusive projects have different lives, and the projects are expected to be replaced indefinitely as they wear out, an adjustment needs to be made in the decision-making process. There are two procedures to make this adjustment:

1. Least common multiple of lives approach.
2. Equivalent annual annuity (EAA) approach.

#### Example: Projects with unequal lives

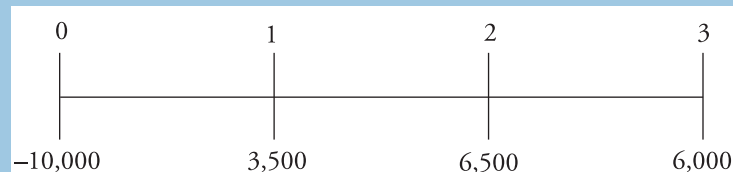
Mayco, Inc. is planning to modernize its production facilities. Mayco is considering purchasing either (1) a book press with a useful life of six years *or* (2) an offset printer, which has a useful life of three years. The time lines presented in the following two figures show the cash flows, NPVs, and IRRs for both of these mutually exclusive projects.

#### Expected Cash Flows (in dollars) for Book Press



$NPV_{\text{press}} @ 12\% = \$3,245.47$ ;  $IRR = 17.5\%$ .

#### Expected Cash Flows (in dollars) for the Offset Printer Project



$NPV_{\text{printer}} @ 12\% = \$2,577.44$ ;  $IRR = 25.20\%$ .

**Evaluate** these projects using both the replacement chain and equivalent annual annuity approaches, assuming whichever process is chosen will be repeated indefinitely.



**Answer:**

### Least Common Multiple of Lives Method

The NPVs indicate the book press should be selected:

$$\text{NPV}_{\text{press}} = \$3,245.47 > \text{NPV}_{\text{printer}} = \$2,577.44$$

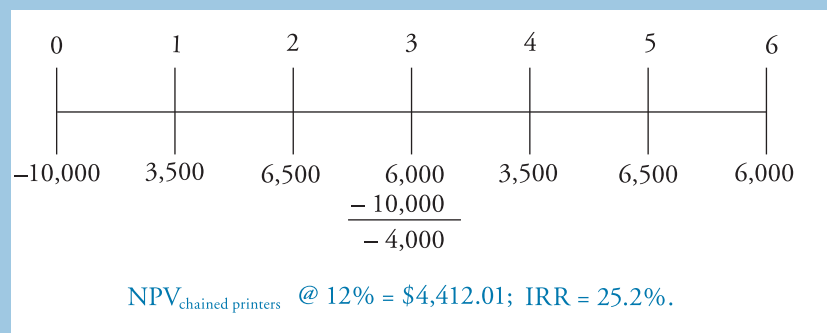
However, the IRRs recommend the opposite decision because the IRR of the offset printer is larger than the IRR of the book press. To make the comparison meaningful, we can find the NPVs for the two projects over the least common multiple of lives.

In this case, the least common multiple of lives is six years. This means that, for the printer, we will need to buy another 3-year printer in year 3 to make it comparable to the 6-year press. Assuming no changes in annual cash flows and a constant cost of capital of 12%, we can compute the NPV of the two back-to-back offset printers using the process illustrated in the next figure.



*Professor's Note: A project where equipment will need to be replaced every few years is often called a replacement chain. The key is to analyze the entire chain and not just the first link in the chain.*

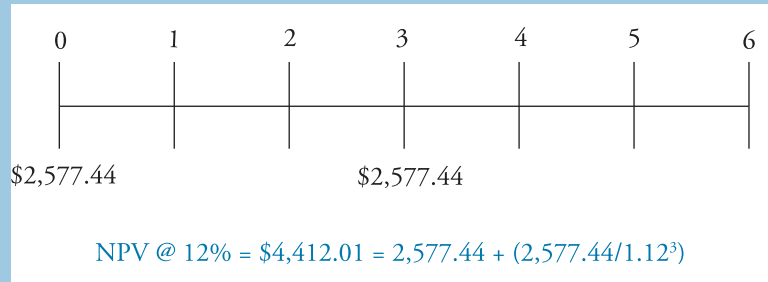
### Replacement Chain for Offset Printer



**Decision:** The NPV of this extended printer project is \$4,412, and its IRR is 25.2%.

Since the \$4,412 extended NPV of two chained-together 3-year printers (six years total) is greater than the \$3,245.50 NPV of the offset press, the printer should be selected.

The next figure illustrates that the value of the cash flow streams of two consecutive printers can be summarized by two separate project NPVs: one at year 0 representing the value of the initial project and one at year 3 representing the value of the replication project.

**Replacement Chain NPVs**

The present value of these two cash flows, when discounted at 12%, is \$4,412, so we again come to the conclusion that the printer should be selected.

**Equivalent Annual Annuity (EAA) Approach**

The EAA approach is a simpler approach to evaluating mutually exclusive projects with different lives. The EAA approach finds the sequence of annual payments that is equal to the project's NPV. The resulting calculation is an annual payment that allows for an “apples to apples” comparison of projects with different lives.

As demonstrated in the next example, there are three steps to the EAA approach.

**Example: EAA approach**

Evaluate the offset printer and the book press from the preceding example using the EAA approach.

**Answer:**

*Step 1:* Find each project's NPV.

$$\begin{aligned}\text{NPV}_{\text{press}} &= \$3,245 \\ \text{NPV}_{\text{printer}} &= \$2,577\end{aligned}$$

*Step 2:* Find an annuity (EAA) that equates to the project's NPV over its individual life at the WACC.

$$\begin{aligned}\text{EAA}_{\text{press}}: \text{PV} &= -3,245; \text{FV} = 0; \text{N} = 6; \text{I} = 12; \\ &\text{compute PMT} = \$789\end{aligned}$$

$$\begin{aligned}\text{EAA}_{\text{printer}}: \text{PV} &= -2,577; \text{FV} = 0; \text{N} = 3; \text{I} = 12; \\ &\text{compute PMT} = \$1,073\end{aligned}$$

Note the negative sign in front of the PV value. This is for the calculator's sign convention and not to signify that the PV is negative.

*Step 3:* Select the project with the highest EAA. In this example, the printer should be accepted because:

$$\text{EAA}_{\text{printer}} > \text{EAA}_{\text{press}}$$



*Professor's Note: As you can see, either of the two methods will lead to the same conclusion. However, per the LOS, you are expected to know both of them!*

## CAPITAL RATIONING

Ideally, firms will continue to invest in positive return NPV projects until the marginal returns equal the marginal cost of capital. Should a firm have insufficient capital to do this, it must ration its capital (allocate its funds) among the best possible combination of acceptable projects. **Capital rationing** is the allocation of a fixed amount of capital among the set of available projects that will maximize shareholder wealth. A firm with less capital than profitable (i.e., positive NPV) projects should choose the combination of projects it can afford to fund that has the greatest total NPV.

Note that capital rationing is not the optimal decision from the firm's perspective. More value would be created by investing in all positive NPV projects. Therefore, capital rationing violates market efficiency because society's resources are not allocated to their best use (i.e., to generate the highest return).

**Hard capital rationing** occurs when the funds allocated to managers under the capital budget cannot be increased. **Soft capital rationing** occurs when managers are allowed to increase their allocated capital budget if they can justify to senior management that the additional funds will create shareholder value.

### Example 1: Capital Rationing

Mayco has a \$2,000 capital budget and has the opportunity to invest in five projects. The initial investment and NPV of the projects are described in the next figure. Determine in which projects Mayco should invest.

#### Projects Available to Mayco

	<i>Investment Outlay</i>	<i>NPV</i>
Project A	–\$800	\$300
Project B	–\$500	\$180
Project C	–\$400	\$100
Project D	–\$350	\$85
Project E	–\$300	–\$50

#### Answer:

Projects A, B, C, and D are all profitable. However, the cost of taking on all four projects would be \$2,050, which would exceed the capital budget. Mayco should choose Projects A, B, and C, which have a total NPV of \$580 and a total outlay of \$1,700. These three projects maximize the NPV while not exceeding the capital budget constraint of \$2,000. The remaining \$300 in the capital budget could then be used elsewhere in the company. Note that Project E is not considered acceptable, regardless of the availability of capital, because of its negative NPV.

**Example 2: Capital Rationing**

Mayco has a \$2,000 capital budget and has the opportunity to invest in five different projects. The initial investment and NPV of the projects are described in the following figure. Determine in which projects Mayco should invest.

**Projects Available to Mayco**

	<i>Investment Outlay</i>	<i>NPV</i>
Project F	–\$1,200	\$500
Project G	–\$1,000	\$480
Project H	–\$800	\$300
Project I	–\$450	\$150
Project J	–\$200	\$40

**Answer:**

All of the projects are profitable, but with a capital budget of only \$2,000, Mayco should choose Projects G, H, and J that have a combined NPV of \$820.

Note that choosing Projects G, H, and J, means that Project F, which has the highest NPV, is not chosen. If Project F were chosen, the next best choice would be Project H, which would max out the capital budget with a combined NPV of only \$800.

Remember, the goal with capital rationing is to maximize the overall NPV within the capital budget, not necessarily to select the individual projects with the highest NPV.

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**LOS 29.d: Explain how sensitivity analysis, scenario analysis, and Monte Carlo simulation can be used to assess the stand-alone risk of a capital project.**


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**Sensitivity analysis** involves changing an input (independent) variable to see how sensitive the dependent variable is to the input variable. For example, by varying sales, we could determine how sensitive a project's NPV is to changes in sales, assuming that all other factors are held constant. The key to sensitivity analysis is to only change one variable at a time.

With sensitivity analysis, we start with the base-case scenario. Base case would be the NPV we determined by using the project's input estimates. Now we change one of the selected variables by a fixed percentage point above and below the base case, noting the effect this change has on the project's NPV. We could do this for all the variables used in the analysis.

**Example: Sensitivity Analysis**

Ferndale Inc. is analyzing a capital budgeting expansion project with the following cash flow forecasts:

- 3-year project
- Unit sales = 1,500 per year
- Price = \$50.00
- Variable cost = \$20.00 per unit
- Fixed cost = \$5,000 per year
- FCInv = \$60,000
- Depreciated straight-line over three years to book value of zero
- NWCInv = \$15,000
- Salvage value at end of three years = \$10,000
- Marginal tax rate = 40%
- Cost of capital = 15%

The base case NPV and IRR are \$11,871 and 23.5%, respectively.

The following figure includes a sensitivity analysis of the key inputs assuming a 20% increase and decrease in each variable, holding the others constant. (We haven't provided the solutions here because we want to focus on sensitivity analysis, but feel free to check our answers!)

**Ferndale Inc. Sensitivity Analysis**

<i>Input Estimate</i>		<i>Down 20%</i>	<i>Base Case</i>	<i>Up 20%</i>
Unit sales	NPV	–\$458	\$11,871	\$24,200
	IRR	14.7%	23.5%	32.2%
Price	NPV	–\$8,678	\$11,871	\$32,420
	IRR	8.6%	23.5%	37.8%
Variable costs	NPV	\$20,091	\$11,871	\$3,651
	IRR	29.3%	23.5%	17.6%
Fixed costs	NPV	\$13,241	\$11,871	\$10,501
	IRR	24.5%	23.5%	22.5%
Salvage value	NPV	\$11,083	\$11,871	\$12,660
	IRR	23%	23.5%	24%

To which inputs are the NPV and the IRR estimates (1) most sensitive and (2) least sensitive?

**Answer:**

The project's NPV and IRR are most sensitive to changes in price because when price drops by 20% the NPV goes from positive to negative. The project is also sensitive to changes in unit sales because a 20% drop in sales will generate a negative NPV. The project appears to be least sensitive to changes in the estimate of salvage value and fixed costs.

**Scenario analysis** is a risk analysis technique that considers both the sensitivity of some key output variable (e.g., NPV) to changes in a key input variable (e.g., sales) and the likely probability distribution of these variables. The key difference between scenario analysis and sensitivity analysis is that scenario analysis allows for changes in multiple input variables all at once. In scenario analysis, we study the different possible scenarios, such as *worst case*, *best case*, and *base case*.

A scenario analysis for the Ferndale capital budgeting project is shown in Figure 4. Notice that in the worst case scenario unit sales, price, and salvage value are down 20%, while fixed and variable costs are up 20%. In the best case scenario, unit sales, price, and salvage value are up 20%, while costs are down 20%. In fact, the worst case scenario is so bad that the IRR is negative.

**Figure 4: Ferndale Inc. Scenario Analysis**

	<i>Worst Case</i>	<i>Base Case</i>	<i>Best Case</i>
Unit sales	Down 20%	1,500	Up 20%
Price	Down 20%	\$50	Up 20%
Variable costs	Up 20%	\$20	Down 20%
Fixed costs	Up 20%	\$5,000	Down 20%
Salvage value	Down 20%	\$10,000	Up 20%
<b>NPV</b>	<b>–\$25,632</b>	<b>\$11,871</b>	<b>\$60,882</b>
<b>IRR</b>	<b>–4.4%</b>	<b>23.5%</b>	<b>56.8%</b>

**Simulation analysis** (or **Monte Carlo simulation**) results in a probability distribution of project NPV outcomes, rather than just a limited number of outcomes as with sensitivity or scenario analysis (e.g., base case, best case, worst case). The steps in simulation analysis are as follows:

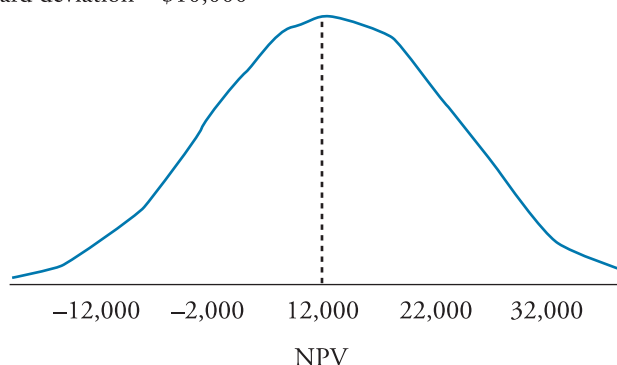
- Step 1:* Assume a specific probability distribution for each input variable. For example, we might assume that unit sales are normally distributed with a mean of 100,000 and a standard deviation of 15,000, unit prices are normally distributed with a mean of \$40 and a standard deviation of \$5, and so on for each input variable. We don't necessarily have to assume a normal distribution for each variable, however.
- Step 2:* Simulate a random draw from the assumed distribution of each input variable. That results in a single value for each of the inputs. For example, our first draw might be unit sales of 85,000, a unit price of \$42.00, and so on.
- Step 3:* Given each of the inputs from Step 2, calculate the project NPV.
- Step 4:* Repeat Step 2 and Step 3 10,000 times.
- Step 5:* Calculate the mean NPV, the standard deviation of the NPV, and the correlation of NPV with each input variable.
- Step 6:* Graph the resulting 10,000 NPV outcomes as a probability distribution.

For example, our NPV probability distribution for a simulation analysis of the Ferndale expansion project might look like Figure 5. Notice that the probability distribution in Figure 5 is not symmetrical or necessarily perfectly normal. That will typically be the case, although with a large number of observations, the distribution is likely to be approximately normal.

**Figure 5: Example of Simulation Analysis**

Mean NPV = \$12,000

Standard deviation = \$10,000



**LOS 29.e: Discuss the procedure for determining the discount rate to be used in valuing a capital project and calculate a project's required rate of return using the capital asset pricing model (CAPM).**

In the capital asset pricing model (CAPM), risk is separated into systematic and unsystematic components. Unsystematic, or company-specific, risk can be diversified away, while systematic, or market, risk cannot be diversified away. A diversified investor is compensated for taking on systematic risk, but not unsystematic risk. In a capital budgeting context, beta, a systematic risk measure, is appropriate for measuring project or asset risk when a company is, or the company's investors are, diversified. The project's or asset's beta in conjunction with the CAPM can be used to determine the appropriate discount rate for the asset or project.



*Professor's Note: The CAPM is also covered in Study Sessions 10 and 18.*

Beta risk is based on the equation of the CAPM, or the security market line (SML), which defines a project's required rate of return (discount rate) using the equation:

$$R_{\text{project}} = R_F + \beta_{\text{project}} [E(R_{\text{MKT}}) - R_F]$$

where:

$R_F$  = risk-free rate

$\beta_{\text{project}}$  = project beta

$E(R_{\text{MKT}}) - R_F$  = market risk premium

**Example: Using the SML to estimate the discount rate for a capital project**

Compute the NPV for a 3-year project that has a beta of 1.2. The initial investment is \$1,000, and the project will generate annual cash flows of \$400. Assume the risk-free interest rate is 8% and the expected market return is 13%.

**Answer:**

The appropriate discount rate for the project is:

$$R_{\text{project}} = R_F + \beta_{\text{project}} [E(R_{\text{MKT}}) - R_F] = 8\% + [1.2(13\% - 8\%)] = 14\%$$

The project's NPV at a cost of capital of 14% is -\$71.35. You can either calculate the NPV using the NPV function on your financial calculator or the following formula:

$$\text{NPV} = -\$1,000 + \frac{\$400}{1.14} + \frac{\$400}{1.14^2} + \frac{\$400}{1.14^3} = -\$71.35$$

Using a project's beta to determine discount rates is important when the risk of a project is different from the risk of the overall company. Simply using the company's weighted average cost of capital (WACC) will overstate the required return for a conservative (low beta) project and will understate the required return for an aggressive (high beta) project.

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**LOS 29.f: Discuss the types of real options and evaluate a capital project using real options.**

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**Real options** allow managers to make future decisions that change the value of capital budgeting decisions made today. Real options are similar to financial call and put options in that they give the option holder the right, but not the obligation, to make a decision. The difference is that real options are based on real assets rather than financial assets and are contingent on future events. Real options offer managers flexibility that can improve the NPV estimates for individual projects.

Types of real options include the following:

- **Timing options** allow a company to delay making an investment with the hope of having better information in the future.
- **Abandonment options** are similar to put options. They allow management to abandon a project if the present value of the incremental cash flows from exiting a project exceeds the present value of the incremental cash flows from continuing a project.
- **Expansion options** are similar to call options. Expansion options allow a company to make additional investments in a project if doing so creates value.
- **Flexibility options** give managers choices regarding the operational aspects of a project. The two main forms are price-setting and production flexibility options.
  - ♦ *Price-setting* options allow the company to change the price of a product. For example, the company may raise prices if demand for a product is high in order to benefit from that demand without increasing production.
  - ♦ *Production-flexibility* options may include paying workers overtime, using different materials as inputs, or producing a different variety of product.



- **Fundamental options** are projects that are options themselves because the payoffs depend on the price of an underlying asset. For example, the payoff for a copper mine is dependent on the market price for copper. If copper prices are low, it may not make sense to open a copper mine, but if copper prices are high, opening the copper mine could be very profitable. The operator has the option to close the mine when prices are low and open it when prices are high.

A manager can use a number of different approaches for evaluating the profitability of an investment with real options. Examples of different approaches include the following:

- *Determining the NPV of the project without the option.* A real option adds value to a project, even if it is difficult to determine the monetary amount of that value. If the NPV of the project without the option is positive, the analyst knows that the project with the option must be even more valuable, and determining a specific value for the option is unnecessary.
- *Calculate the project NPV without the option and add the estimated value of the real option.* In equation form, this can be expressed as:

$$\text{overall NPV} = \text{project NPV (based on DCF)} - \text{option cost} + \text{option value}$$

Assume that an analyst determines that the NPV of a project is –\$100 million. If the analyst believes that the real option value net of its cost is at least \$100 million, it makes sense to take on the project. This method effectively determines a “hurdle value” that the option must exceed in order for the project to add value.

- *Use decision trees.* This method does not determine a value for the option but may allow a manager to make a more informed choice by showing the sequence of decisions made.
- *Use option pricing models.* This method may require the use of complex equations or special consultants.



*Professor's Note: Option pricing models are discussed in Study Session 17.*

#### Example: Production-flexibility option

Black Pearl Yachts estimated that the NPV of the expected cash flows from a new production facility to produce Classic Yachts is negative \$8 million. Black Pearl's production manager is evaluating an additional investment of \$5 million in equipment that would give management the flexibility to switch between Classic, Deluxe, and Elite models of yachts depending on demand. The option to switch production among models of yachts is estimated to have a value of \$15 million. Evaluate the profitability of the project, including the real option.

#### Answer:

$$\text{overall NPV} = \text{project NPV} - \text{option cost} + \text{option value}$$

$$\text{overall NPV} = -\$8 \text{ million} - \$5 \text{ million} + \$15 \text{ million} = \$2 \text{ million}$$

Without the option, the NPV of the production facility is negative. However, the real option adds enough value to make the overall project profitable.

**Example: Abandonment option**

Recall from an earlier example the 3-year project with a project cost of capital of 14%. The initial investment is \$1,000 and the expected cash flows are \$400. We determined previously that based on this discounted cash flow (DCF) analysis that the NPV was  $-\$71.35$ . The appropriate decision based on this analysis is to not undertake the project.

Suppose instead that we have more information on the expected cash flows. First, there is a 50% probability that the cash flows will be \$200 and a 50% probability that they will be \$600 (i.e., the expected cash flows are still \$400). In addition, at the end of the first year we will know whether the project is a success (cash flow is \$600) or a failure (\$200), and we have the option to abandon the project at the end of the first year and receive the salvage value of \$650.

First determine the optimal abandonment strategy. Then calculate the project's NPV and the value of the abandonment option using that strategy.

**Answer:**

By abandoning the project, we receive the salvage value of \$650 but give up the cash flows in years 2 and 3. Therefore, the optimal strategy is to abandon the project at the end of the first year if the present value of the remaining cash flows in years 2 and 3 is less than the salvage value of \$650.

If the project is a *success*, the cash flows will be \$600 in years 2 and 3, and the present value of those cash flows at the end of year 1 at 14% is \$988 ( $N = 2$ ;  $I/Y = 14$ ;  $PMT = \$600$ ;  $CPT PV = \$988$ ). This is larger than the salvage value of \$650, so the optimal strategy is to not abandon the project if we determine at the end of the first year that it is a success.

If the project is a *failure*, the cash flows in years 2 and 3 will only be \$200. The present value drops to \$329 ( $N = 2$ ;  $I/Y = 14$ ;  $PMT = \$200$ ;  $CPT PV = \$329$ ), which is less than the salvage value of \$650, so if the project is a failure, the optimal strategy is to abandon the project.

If the project is a success (the probability of which is 50%), we will receive \$600 at the end of each of the three years, and the NPV is:

$$NPV = -\$1,000 + \frac{\$600}{1.14} + \frac{\$600}{1.14^2} + \frac{\$600}{1.14^3} = \$393$$

If the project is a failure (a 50% probability), we will receive \$200 at the end of the first year plus the salvage value of \$650, and the NPV is:

$$NPV = -\$1,000 + \frac{\$200 + \$650}{1.14} = -\$254$$

The project's expected present value with the abandonment option is:

$$NPV = 0.5(\$393) + 0.5(-\$254) = \$69.50$$

The value of the option is:

$$\text{value of abandonment option} = \$69.50 - (-\$71.35) = \$140.85$$

The abandonment option has made the project viable; we should now accept it because the NPV is greater than 0.

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### LOS 29.g: Discuss common capital budgeting pitfalls.

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Common mistakes managers make when evaluating capital projects include the following:

- *Failing to incorporate economic responses into the analysis.* For example, if a profitable project is in an industry with low barriers to entry, competitors may undertake a similar project, lowering profitability.
- *Misusing standardized templates.* Since managers may evaluate hundreds of projects in a given year, they often create templates to streamline the analysis process. However, the template may not be an exact match for the project, resulting in estimation errors.
- *Pet projects of senior management.* Projects that have the personal backing of influential members of senior management may contain overly optimistic projections that make the project appear more profitable than it really is. In addition, the project may not be subjected to the same level of analysis as other projects.
- *Basing investment decisions on EPS or ROE.* Managers whose incentive compensation is tied to increasing EPS or ROE may avoid positive long-term NPV investments that have the short-run effect of reducing EPS or ROE.
- *Using the IRR criterion for project decisions.* Using IRR may result in conflicts with the NPV approach for mutually exclusive projects. The NPV criterion is economically sound, accurately reflects the goal of maximizing shareholder wealth, and should drive the project accept/reject decision when IRR and NPV are in conflict.
- *Poor cash flow estimation.* For a complex project, it is easy to double count or fail to include certain cash flows in the analysis. For example, the effects of inflation must be properly accounted for.
- *Misestimation of overhead costs.* The cost of a project should include only the incremental overhead costs related to management time and information technology support. These costs are often difficult to quantify, and over or underestimation can lead to incorrect investment decisions.
- *Using the incorrect discount rate.* The required rate of return on the project should reflect the project's risk. Simply using the company's WACC as a discount rate without adjusting it for the risk of the project may lead to significant errors when estimating the NPV of a project.
- *Politics involved with spending the entire capital budget.* Many managers try to spend their entire capital budget each year and ask for an increase for the following year. In a company with a culture of maximizing shareholder value, managers will return excess funds whenever there is a lack of positive NPV projects and make a case for expanding the budget when there are multiple positive NPV opportunities.

- *Failure to generate alternative investment ideas.* Generating investment ideas is the most important step of the capital budgeting process. However, once a manager comes up with a “good” idea, they may go with it rather than coming up with an idea that is “better.”
- *Proper handling of sunk and opportunity costs.* Managers should not consider sunk costs in the evaluation of a project because they are not incremental cash flows. Managers should always consider opportunity costs because they are incremental. However, in reality, many managers do this incorrectly.

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### LOS 29.h: Calculate and interpret accounting income and economic income in the context of capital budgeting.

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Accounting and economic income measures are alternatives to the basic discounted incremental cash flow approach used in the standard capital budgeting model.

A project's **economic income** is equal to the after-tax cash flow plus the change in the investment's market value. As with the basic capital budgeting model, interest is ignored for cash flow calculations and is instead included as a component of the discount rate.

$$\text{economic income} = \text{cash flow} + (\text{ending market value} - \text{beginning market value})$$

or

$$\text{economic income} = \text{cash flow} - \text{economic depreciation}$$

where:

$$\text{economic depreciation} = (\text{beginning market value} - \text{ending market value})$$

A project's **accounting income** is the reported net income on a company's financial statements that results from an investment in a project. Accounting income will differ from economic income because:

- Accounting depreciation is based on the original cost (not market value) of the investment.
- Financing costs (e.g., interest expense) are considered as a separate line item and subtracted out to arrive at net income. In the basic capital budgeting model, financing costs are reflected in the WACC.



*Professor's Note: Knowing how to calculate accounting income is nothing more than knowing how to construct the firm's income statement.*

These concepts are best illustrated with an example.

#### Example: Economic and accounting income

Blue Wave is a startup company that uses a brushless machine to wash cars. Suppose Blue Wave makes an initial investment in equipment of \$200,000. The equipment is depreciated on a straight-line basis over four years to a zero book value. At the end of four years, the equipment will have a salvage value of \$10,000. Blue Wave's marginal tax rate is 30%. The company is financed with 50% debt and 50% equity. The debt carries an interest rate of 6%, and the cost of equity is 19.8%. Blue Wave only expects to operate for the four year duration of the project, so all income is distributed to bondholders and stockholders. The company plans to maintain a 50% debt to value ratio.

Blue Wave expects to have sales, expenses, and cash flows for the next four years as shown in the following figure:

**Sales, Expenses, and Cash Flows for Blue Wave**

	<i>Year 1</i>	<i>Year 2</i>	<i>Year 3</i>	<i>Year 4</i>
Sales	\$400,000	\$450,000	\$450,000	\$400,000
Variable expenses	(150,000)	(175,000)	(175,000)	(150,000)
Fixed expenses	(40,000)	(40,000)	(40,000)	(40,000)
Depreciation	<u>(50,000)</u>	<u>(50,000)</u>	<u>(50,000)</u>	<u>(50,000)</u>
Operating income (EBIT)	160,000	185,000	185,000	160,000
Taxes at 30%	<u>(48,000)</u>	<u>(55,500)</u>	<u>(55,500)</u>	<u>(48,000)</u>
Operating income after taxes	112,000	129,500	129,500	112,000
Add back depreciation	<u>50,000</u>	<u>50,000</u>	<u>50,000</u>	<u>50,000</u>
After-tax operating cash flow	162,000	179,500	179,500	162,000
Salvage value				10,000
Tax on salvage value				(3,000)
After tax salvage value				7,000
<b>Total after-tax cash flow</b>	<b>\$162,000</b>	<b>\$179,500</b>	<b>\$179,500</b>	<b>\$169,000</b>

The project's required rate of return (i.e., its cost of capital) is the WACC. Calculate the project's NPV, economic income, accounting income, and discuss the differences between the various income measures.

**Answer:**

*Calculate WACC:*

$$\begin{aligned}\text{WACC} &= (0.198)(0.5) + (0.06)(1 - 0.3)(0.5) \\ &= 0.12, \text{ or } 12\%\end{aligned}$$

*Calculate NPV:*

$$\text{NPV} = -\$200,000 + \frac{\$162,000}{1.12^1} + \frac{\$179,500}{1.12^2} + \frac{\$179,500}{1.12^3} + \frac{\$169,000}{1.12^4} = \$322,906$$

*Calculate economic income:*

The cash flows for Blue Wave's project are already determined in the next figure. The beginning market value at any point is the present value of the remaining after-tax cash flows discounted at the 12% WACC. Beginning market value for Year 1 is the value at time 0 or PV of cash flows for periods 1 through 4 or \$522,906. The economic income for years 1 through 4 are shown in the following figure.

**Economic Income for Blue Wave**

	<i>Year 1</i>	<i>Year 2</i>	<i>Year 3</i>	<i>Year 4</i>
Beginning market value	\$522,906	\$423,655	\$294,994	\$150,893
Ending market value	<u>423,655</u>	<u>294,994</u>	<u>150,893</u>	<u>0</u>
Change in market value	-99,251	-128,661	-144,101	-150,893
After-tax cash flow	<u>162,000</u>	<u>179,500</u>	<u>179,500</u>	<u>169,000</u>
<b>Economic income</b>	<b>\$62,749</b>	<b>\$50,839</b>	<b>\$35,399</b>	<b>\$18,107</b>
Economic rate of return	12%	12%	12%	12%

For year 1:

$$\text{ending market value} = \frac{\$179,500}{1.12^1} + \frac{\$179,500}{1.12^2} + \frac{\$169,000}{1.12^3} = \$423,655$$

$$\text{economic income} = \$162,000 - \$99,251 = \$62,749$$

$$\text{economic rate of return} = \$62,749 / \$522,906 = 12\%$$

The economic income rate of return for each year is precisely equal to the project's WACC. This makes sense because the WACC is the discount rate used to determine the value of the company.

*Calculate accounting income:*

**Accounting Income for Blue Wave**

	<i>Year 1</i>	<i>Year 2</i>	<i>Year 3</i>	<i>Year 4</i>
Sales	\$400,000	\$450,000	\$450,000	\$400,000
Variable expenses	(150,000)	(175,000)	(175,000)	(150,000)
Fixed expenses	(40,000)	(40,000)	(40,000)	(40,000)
Depreciation	<u>(50,000)</u>	<u>(50,000)</u>	<u>(50,000)</u>	<u>(50,000)</u>
Operating income (EBIT)	160,000	185,000	185,000	160,000
Interest expense (50% of company value at 6% rate)	<u>(15,687)</u>	<u>(12,710)</u>	<u>(8,850)</u>	<u>(4,527)</u>
Earnings before tax (EBT)	144,313	172,290	176,150	155,473
Taxes at 30%	<u>(43,294)</u>	<u>(51,687)</u>	<u>(52,845)</u>	<u>(46,642)</u>
Net income before salvage	101,019	120,603	123,305	108,831
After tax salvage value				7,000
<b>Net (Accounting) Income</b>	<b>\$101,019</b>	<b>\$120,603</b>	<b>\$123,305</b>	<b>\$115,831</b>

Interest expense is calculated by assuming that Blue Wave finances 50% of the project's market value with debt at a pre-tax cost of debt of 6%. Each year, interest expense is equal to 6% of beginning market value times 0.5. For example, year 2 interest expense is 6% of  $(\$423,665 \times 0.5)$ , or \$12,710.

The accounting income differs from the economic income for two reasons.

1. Accounting depreciation is based on the original cost of the investment, while economic depreciation (beginning – ending value) is based on the market value of the asset. The economic depreciation for the project is much larger than the accounting depreciation, resulting in an economic income amount that is much smaller than accounting income.
2. Interest expense is deducted from the accounting income figure. Interest expense is ignored when computing economic income because it is reflected in the WACC.

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**LOS 29.i: Differentiate among and evaluate a capital project using the following valuation models: economic profit, residual income, and claims valuation.**

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**Economic profit** is a measure of profit in excess of the dollar cost of capital invested in a project. It is calculated as:

$$EP = NOPAT - \$WACC$$

where:

NOPAT = net operating profit after tax = EBIT (1 – tax rate)

\$WACC = dollar cost of capital = WACC × capital

capital = dollar amount of investment



*Professor's Note: Make sure you can distinguish between economic income and economic profit. They sound like they refer to the same concept ("income" and "profit") but in fact, the calculations are very different. Also, economic income in capital budgeting context is not the same as economic income used in equity valuation concept.*

**Example: Calculating economic profit**

Using the data from our previous example, calculate the economic profit for Blue Wave in years 1 through 4.

**Answer: Economic Profit for Blue Wave**

	<i>Year 1</i>	<i>Year 2</i>	<i>Year 3</i>	<i>Year 4</i>
Capital	\$200,000	\$150,000	\$100,000	\$50,000
NOPAT	112,000	129,500	129,500	119,000*
\$WACC	<u>24,000</u>	<u>18,000</u>	<u>12,000</u>	<u>6,000</u>
<b>Economic profit</b>	<b>\$88,000</b>	<b>\$111,500</b>	<b>\$117,500</b>	<b>\$113,000</b>

\*Year 4 NOPAT of \$119,000 includes the gain from the sale.



*Professor's Note: Capital is simply the \$200,000 initial investment reduced by depreciation of \$50,000 each year.*

Once the economic profit is determined, it is easily applied to the valuation of an asset. The NPV based on economic profit is called the **market value added (MVA)** and is calculated as:

$$\text{NPV} = \text{MVA} = \sum_{t=1}^{\infty} \frac{\text{EP}_t}{(1 + \text{WACC})^t}$$

The economic profit approach focuses on returns to all suppliers of capital, which includes both debt and equity holders, and therefore the appropriate discount rate is the WACC.

Discounting the four years of economic profit for Blue Wave gives an MVA of:

$$\text{MVA} = \frac{\$88,000}{1.12^1} + \frac{\$111,500}{1.12^2} + \frac{\$117,500}{1.12^3} + \frac{\$113,000}{1.12^4} = \$322,906$$

Notice that the MVA is identical to the NPV calculated in the original Blue Wave example. The valuation using economic profit is the same as the valuation using the basic NPV approach. No matter which method is used for determining income, if it is applied correctly, the resulting NPV should be the same.

The value of the company is the NPV of the project plus the initial investment:

$$\text{company value} = \$322,906 + \$200,000 = \$522,906$$

**Residual income** focuses on returns on equity and is determined by subtracting an equity charge from the accounting net income. The equity charge is found by multiplying the required return on equity by the beginning book value of equity.

The calculation for residual income is:

$$\text{residual income} = \text{net income} - \text{equity charge}$$

or

$$\text{RI}_t = \text{NI}_t - r_e B_{t-1}$$

where:

$\text{RI}_t$  = residual income in period  $t$

$\text{NI}_t$  = net income in period  $t$

$r_e$  = required return on equity

$B_{t-1}$  = beginning of period book value of equity

Like other capital budgeting methods, discounting the residual income at the required rate of return on equity will give the NPV of the investment.

$$\text{NPV} = \sum_{t=1}^{\infty} \frac{\text{RI}_t}{(1 + r_e)^t}$$



The residual income approach focuses only on returns to equityholders; therefore, the appropriate discount rate is the required return on equity.

### Example: Residual income method applied to Blue Wave

Recall that the WACC for the Blue Wave project is 12%, and the required return on equity is 19.8%. Beginning book value of assets on the balance sheet is equal to the initial outlay in the project of \$200,000. The book value is depreciated straight-line to zero over four years, so assets decline by \$50,000 each year. Liabilities each year are equal to 50% of the market value of the project. Balance sheet data is provided in the following table.

#### Blue Wave Balance Sheet

Year	0	1	2	3	4
Assets	\$200,000.0	\$150,000.0	\$100,000.0	\$50,000.0	\$0
Liabilities	\$261,453.0	\$211,827.5	\$147,497.0	\$75,446.5	\$0
Net Worth	-\$61,453.0	-\$61,827.5	-\$47,497.0	-\$25,446.5	\$0

Calculate the NPV of the Blue Wave project and the company using the residual income method.

#### Answer:

First calculate residual income in each year. Residual income is equal to net income minus the charge for equity, which is equal to beginning net worth times the required return on equity. This example is somewhat different because net worth is negative, so the equity charge is negative. That typically won't be the case.

Year	1	2	3	4
Net income	\$101,019.00	\$120,603.00	\$123,305.00	\$115,831.00
$r_e B_{t-1} = 0.198B_{t-1}$	<u>-\$12,167.69</u>	<u>-\$12,241.85</u>	<u>-\$9,404.41</u>	<u>-\$5,038.41</u>
Residual income	\$113,186.69	\$132,844.85	\$132,709.41	\$120,869.41

The present value at 19.8% (the required return on equity) of the residual income stream is \$322,906. Therefore, the NPV of the project is \$322,906, which is the same value calculated from applying the previous valuation methods.

The value of the company is the sum of the present value of the residual income plus the equity investment (net worth in year 0) plus the debt investment:

$$\text{company value} = \$322,906 + (-\$61,453) + \$261,453 = \$522,906$$



*Professor's Note: See Study Session 12 for a more comprehensive treatment of residual income.*

The **claims valuation approach** divides operating cash flows based on the claims of debt and equityholders that provide capital to the company. These debt and equity cash flows are valued separately and then added together to determine the value of the company.



*Professor's Note: The claims valuation method calculates the value of the company, not the project. This is different from the economic profit and residual income approaches, which calculate both project and company value.*

The claims valuation approach is based on the balance sheet concept that assets equal liabilities plus equity. Every asset is financed by some combination of debt and equity, and the claims valuation approach merely separates the cash flows provided by the asset into the proportionate debt and equity components.

- The *cash flows to debtholders* consist of interest and principal payments and are discounted at the cost of debt.
- The *cash flows to equityholders* are dividends and share repurchases and are discounted at the cost of equity.

The sum of the present value of each stream of cash flows will equal the value of the company.

We can demonstrate the claims valuation method using the Blue Wave information.

Cash flow to bondholders is equal to principal repayments (the change in liabilities from the balance sheet) plus interest expense, as shown in the Figure 6.

**Figure 6: Cash Flow to Blue Wave Bondholders**

Year	1	2	3	4
Principal payments	\$49,625.50	\$64,330.50	\$72,050.50	\$75,446.50
Interest expense	<u>15,687.00</u>	<u>12,710.00</u>	<u>8,850.00</u>	<u>4,527.00</u>
Cash flow to bondholders	\$65,312.50	\$77,040.50	\$80,900.50	\$79,973.50

You can verify that the present value of these cash flows at the cost of debt (6%) is \$261,453, which is the market value of the debt.

The cash flow to shareholders is equal to operating cash flow (net income plus depreciation) minus the debt payments to bondholders, as shown in the following figure.

**Figure 7: Cash Flow to Blue Wave Shareholders**

Year	1	2	3	4
Net income	\$101,019.00	\$120,603.00	\$123,305.00	\$115,831.00
Plus: Depreciation	<u>50,000.00</u>	<u>50,000.00</u>	<u>50,000.00</u>	<u>50,000.00</u>
Operating cash flow	151,019.00	170,603.00	173,305.00	165,831.00
Less: Debt payments	<u>49,625.50</u>	<u>64,330.50</u>	<u>72,050.50</u>	<u>75,446.50</u>
Dividends	\$101,393.50	\$106,272.50	\$101,254.50	\$90,384.50

You can verify that the present value of these cash flows at the cost of equity (19.8%) is \$261,453, which is the market value of the equity.

The value of the company is the sum of the market value of the debt and equity:

$$\text{company value} = \$261,453 + \$261,453 = \$522,906$$

This is the same company value we calculated using the economic profit and the residual income methods. Note that the value of debt is equal to the value of equity in this example because the company is financed with 50% debt and 50% equity, so the debt to equity ratio is 1:1.

Whether the economic profit, residual income, or claims valuation method for determining income is used, the key is that in theory, any of the three methods should result in the same value for the company. In practice, however, accounting complications, such as pension adjustments, goodwill, and deferred taxes, may complicate the calculation of income, leading some analysts to prefer a particular method.



*Professor's Note: These accounting complications are addressed in exhaustive detail in Study Sessions 5 through 7.*

## KEY CONCEPTS

### LOS 29.a

For an expansion project:

- Initial outlay =  $FCInv + WCIInv$
- $CF = (S - C - D)(1 - T) + D = (S - C)(1 - T) + DT$
- $TNOCF = Sal_T + NWCInv - T(Sal_T - B_T)$

For a replacement project, the cash flows are the same as the above except:

- Current after-tax salvage value of the old assets reduces the initial outlay.
- Depreciation is the change in depreciation if the project is accepted compared to the depreciation on the old machine.

Depreciation schedules affect capital budgeting decisions because they affect after-tax cash flows. In general, accelerated depreciation methods lead to higher after-tax cash flows and a higher project NPV.

### LOS 29.b

Inflation is a complication that must be considered as part of the capital budgeting process:

- Nominal cash flows must be discounted at the nominal interest rate, and real cash flows must be discounted at the real interest rate.
- Unexpected changes in inflation affect project profitability.
- Inflation reduces the real tax savings from depreciation.
- Inflation decreases the value of fixed payments to bondholders.
- Inflation affects costs and revenues differently.

### LOS 29.c

There are two methods to compare projects with unequal lives that are expected to be repeated indefinitely:

- The least common multiple of lives approach extends the lives of the projects so that the lives divide equally into the chosen time horizon. It is assumed that the projects are repeated over the time horizon, and the NPV over this horizon is used as the decision criterion.
- The equivalent annual annuity of each project is the annuity payment each project year that has a present value (discounted at the WACC) equal to the NPV of the project.

Capital rationing is the allocation of a fixed amount of capital among the set of available projects that will maximize shareholder wealth. A firm with less capital than profitable (positive NPV) projects should choose the combination of projects it can afford to fund that has the greatest total NPV.

**LOS 29.d**

Risk analysis techniques include:

- Sensitivity analysis involves varying an independent variable to see how much the dependent variable changes, all other things held constant.
- Scenario analysis considers the sensitivity of the dependent variable to simultaneous changes in all of the independent variables.
- Simulation analysis uses repeated random draws from the assumed probability distributions of each input variable to generate a simulated distribution of NPV.

**LOS 29.e**

The CAPM can be used to determine the appropriate discount rate for a project based on risk. The project beta,  $\beta$ , is used as a measure of the systematic risk of the project, and the security market line (SML) estimates the required return as:

$$R_{\text{project}} = R_f + \beta_{\text{project}} [E(R_M) - R_f]$$

**LOS 29.f**

Real options allow managers to make future decisions that change the value of capital budgeting decisions made today.

- Timing options allow a company to delay making an investment.
- Abandonment options allow management to abandon a project if the PV of the incremental CFs from exiting a project exceeds the PV value of the incremental CFs from continuing a project.
- Expansion options allow a company to make additional investments in a project if doing so creates value.
- Flexibility options give managers choices regarding the operational aspects of a project. The two main forms are price-setting and production flexibility options.
- Fundamental options are projects that are options themselves because the payoffs depend on the price of an underlying asset.

Approaches to evaluating a capital project using real options include: determining the NPV of the project without the option; calculating the project NPV without the option and adding the estimated value of the real option; using decision trees; and using option pricing models.

**LOS 29.g**

Common mistakes in the capital budgeting process include:

- Failing to incorporate economic responses into the analysis.
- Misusing standardized project evaluation templates.
- Having overly optimistic assumptions for pet projects of senior management.
- Basing long-term investment decisions on short-term EPS or ROE considerations.
- Using the IRR criterion for project decisions.
- Poor cash flow estimation.
- Misestimation of overhead costs.
- Using a discount rate that does not accurately reflect the project's risk.
- Politics involved with spending the entire capital budget.
- Failure to generate alternative investment ideas.
- Improper handling of sunk and opportunity costs.

**LOS 29.h**

Economic income is equal to the after-tax cash flow plus the change in the project's market value. Accounting income is equal to the revenues minus costs of the project.

There are two key factors that account for the differences between economic and accounting income:

- Accounting depreciation is based on the original cost of the investment, while economic depreciation is based on the change in market value of the investment.
- The after-tax cost of debt (interest expense) is subtracted from net income, while financing costs for determining economic income are reflected in the discount rate.

**LOS 29.i**

Alternative forms of determining income should theoretically lead to the same calculated NPV if applied correctly.

- Economic profit is calculated as  $\text{NOPAT} - \$\text{WACC}$ . Economic profit reflects the income earned by all capital holders and is therefore discounted at the WACC to determine the market value added (MVA) or NPV of the investment.
- Residual income is focused on returns to equity holders and is calculated as  $\text{net income} - \text{equity charge}$ . Residual income reflects the income to equityholders only and is discounted at the required return on equity to determine NPV.
- Claims valuation separates cash flows based on the claims that equityholders and debtholders have on the asset. Cash flows to debt holders are discounted at the cost of debt and cash flows to equity holders are discounted at the cost of equity. The present value of each set of cash flows is added together to determine the value of the company.

## CONCEPT CHECKERS

1. Which of the following factors is a firm *least likely* to consider when appropriately evaluating a new project?
  - A. The depreciation expense tax shield on the new project.
  - B. The current market value of any equipment to be replaced.
  - C. Previous expenditures associated with a market test to determine the feasibility of the project.
2. Which of the following statements about capital budgeting is *most accurate*?
  - A. The capital budgeting analysis for expansion and replacement projects is the same.
  - B. If the fixed assets are sold for book value, terminal year after-tax non-operating cash flows equal the cash proceeds from the sale of fixed capital plus the recovery of net working capital.
  - C. The replacement decision involves an analysis of two independent projects where the relevant cash flows include the initial investment, additional depreciation, and the terminal value.

Use the following information to answer Questions 3 through 5.

- Mayco, Inc. is considering the purchase of a new machine for \$60,000. The machine will reduce manufacturing costs by \$5,000 annually.
  - Mayco will use the modified accelerated cost recovery system (MACRS) accelerated method (5-year asset) to depreciate the machine and expects to sell the machine at the end of its 6-year operating life for \$10,000. Use the MACRS table in Figure 1. (Remember, you don't have to memorize the MACRS tables!)
  - The firm expects to be able to reduce net working capital by \$15,000 when the machine is installed, but required working capital will return to the original level when the machine is sold after six years.
  - Mayco's marginal tax rate is 40%, and it uses a 12% cost of capital to evaluate projects of this nature.
3. The first year's MACRS depreciation and the initial cash outlay are *closest* to:
    - A. \$10,000 depreciation and \$60,000 initial outlay.
    - B. \$12,000 depreciation and \$45,000 initial outlay.
    - C. \$12,000 depreciation and \$60,000 initial outlay.
  4. The first year's operating cash flow and terminal year's cash flow excluding the last year's operating cash flow are *closest* to:
    - A. \$4,800 OCF and -\$4,000 CF.
    - B. \$7,800 OCF and -\$4,000 CF.
    - C. \$7,800 OCF and -\$9,000 CF.
  5. Assume for this problem only that the machine is depreciated to zero over six years using the straight-line method and all other information is the same. The NPV of the project is *closest* to:
    - A. -\$20,780.
    - B. -\$18,753.
    - C. -\$17,125.

6. An analyst has collected the following information on a replacement project:

Purchase price of the new machine	\$8,000
Shipping and installation charge	2,000
Sale price of old machine	6,000
Book value of old machine	2,000
Inventory increase if the new machine is installed	3,000
Accounts payable increase if the new machine is installed	1,000
Marginal tax rate	25%

The initial cash flow is *closest* to:

- A. -\$10,000.  
 B. -\$7,000.  
 C. -\$3,000.
7. Michael Eastman and David Mann are part of the management team responsible for evaluating capital projects at Anasi, Inc. The tax laws in the country where Anasi is located allow the company to choose the depreciation method for tax purposes. Eastman is trying to explain to Mann the importance of considering depreciation when making capital budgeting decisions. Eastman makes the following statements:

*Statement 1:* Depreciation is a non-cash expense; however, it is an important part of determining incremental cash flows because it reduces the interest expense paid by the firm.

*Statement 2:* If we use the double-declining balance method of depreciation for tax purposes, the NPV of the project we are considering should be higher than if we use the straight-line method.

Is Eastman *most likely* correct or incorrect with regards to the statements?

- A. Both statements are correct.  
 B. Only one of the statements is correct.  
 C. Neither statement is correct.
8. Bruce Spang is teaching a finance class about the impact of inflation on capital budgeting analysis. Spang makes the following statements to his class:

*Statement 1:* Project cash flows should always be discounted at the real interest rate in order to avoid double counting inflation in the capital budgeting analysis.

*Statement 2:* Inflation tends to affect costs and revenues for a firm proportionally because firms are generally able to pass price increases of inputs along to consumers as price increases in the final product.

Is Spang *most likely* correct or incorrect with regards to the statements?

- A. Both statements are correct.  
 B. Only one of the statements is correct.  
 C. Neither statement is correct.



9. Mayco, Inc. wants to buy a new printer. Mayco is looking at two mutually exclusive projects: A and B.
- Printer A costs \$100,000 and generates positive after-tax cash flows of \$75,000 at the end of each of the next two years.
  - Printer B also costs \$100,000 and has positive after-tax cash flows of \$50,000 at the end of each of the next four years.
  - Printer A can be replaced at the end of its life with the cash inflows and outflows remaining the same. It has no salvage value.
  - Both printers are expected to be replaced indefinitely with the same type at the end of their useful lives.

Assuming a 4-year replacement chain and a 10% cost of capital, which of the following choices is *closest* to the net present value (NPV) of Printer A and Printer B?

	<u>NPV (A)</u>	<u>NPV (B)</u>
A.	\$63,996	\$56,884
B.	\$55,095	\$58,493
C.	\$75,221	–\$3,786

10. Mayco, Inc. is evaluating two mutually exclusive investment projects. Assume both projects can be repeated indefinitely. Printer A has an NPV of \$20,000 over a 3-year life, and Printer B has a NPV of \$25,000 over a 5-year life. The project types are equally risky, and the firm's cost of capital is 12%. Which of the following choices is *closest* to the equivalent annual annuity (EAA) of project A and B?

	<u>EAA (A)</u>	<u>EAA (B)</u>
A.	\$8,327	\$6,935
B.	\$3,567	\$5,326
C.	\$7,592	\$5,779

11. Which of the following statements about replacement decisions is *least accurate*?
- Any loss on the sale of the old equipment is multiplied by the tax rate and is treated as an initial cash outflow.
  - The present value of depreciation expense on the new equipment multiplied by the tax rate is treated as an operating inflow.
  - The present value of the after-tax benefits of a cost reduction resulting from a new investment is treated as an operating inflow.

12. Elaine Smith has been given responsibility for developing General Pacific Company's capital budgeting policy manual. In a meeting with her team, she makes the following statements:
- Statement 1:* The equivalent annual annuity approach assumes continuous replacements can and will be made each time the asset's life ends.
- Statement 2:* In comparing mutually exclusive projects with unequal lives, you should always choose the project that has the highest NPV.
- Is Smith *most likely* correct or incorrect with regards to the statements?
- Both statements are correct.
  - Only one of the statements is correct.
  - Neither statement is correct.
13. Which of the following statements about cash flow analysis is *least accurate*?
- Financing cash flows are considered in the incremental cash flow analysis.
  - If two projects are independent, the fact that they have unequal lives does not affect the analysis.
  - An incremental cash flow represents the change in the firm's total cash flow that occurs as a direct result of taking a project.
14. Albert Duffy, Project Manager at Crane Plastics, is considering taking on a new capital project. When presenting the project, Duffy shows members of Crane's executive management team that the project is marginally profitable, but because the company has the ability to use various materials interchangeably through the production process, the project makes sense. The project Duffy is taking on would be *best* described as having a:
- fundamental option.
  - expansion option.
  - flexibility option.
15. Which of the following statements about Monte Carlo simulation is *least accurate*? Monte Carlo simulation:
- can be useful for estimating a project's stand-alone risk.
  - is capable of using probability distributions for variables as input data.
  - uses best- and worst-case scenarios to determine the most likely outcome.
16. Which of the following statements is *least accurate*?
- If a project is riskier than the firm's normal project, the firm should adjust the project's discount rate upward.
  - In the absence of capital rationing, a firm should take all projects with a positive net present value.
  - When capital is rationed, the projects with the highest IRRs should be selected.

17. Eldon Windows Inc. has an \$80,000 capital budget and has the opportunity to invest in five different projects. The initial investment and NPV of the projects is shown in the table. In which combination of projects should Eldon Windows invest?

	<i>Investment Outlay</i>	<i>NPV</i>
Project 1	–\$45,000	\$18,000
Project 2	–\$40,000	\$16,000
Project 3	–\$20,000	\$9,000
Project 4	–\$18,000	\$8,000
Project 5	–\$15,000	\$4,000

- A. Projects 1, 3, and 5.  
B. Projects 2, 3, and 4.  
C. Projects 1, 3, and 4.

## CHALLENGE PROBLEMS

Use the following information to answer Questions 18 and 19.

McCool Air Conditioning Systems is considering a capital project with the following characteristics:

- The initial investment outlay is \$500,000.
- The project life is three years.
- Annual operating cash flows have a 50% probability of being \$100,000 for three years and a 50% probability of being \$280,000 for three years.
- The required rate of return on the project is 10%.
- There is zero salvage value at project termination.
- In one year, after realizing the first cash flow, the company has the opportunity to abandon the project and receive a cash flow of \$250,000.

18. Assuming that there is no abandonment option, the project's NPV is *closest* to:
  - A. -\$27,498.
  - B. \$12,545.
  - C. \$22,622.
  
19. Assuming that McCool follows the optimal abandonment strategy, the NPV of the project, inclusive of the abandonment option, is *closest* to:
  - A. -\$12,545.
  - B. \$7,250.
  - C. \$12,545.
  
20. Elaine Smith of General Pacific Company is analyzing a 5-year expansion project to increase manufacturing capacity. The project requires an investment in net working capital of \$500,000 that will be recovered at the end of the project and has a cost of capital of 10%. In her analysis, Smith assumes that the two cash flows net out to zero over the life of the project, so she does not include a cash flow for net working capital at the beginning or the end of the project. Assuming she correctly analyzes all the other components of the project, Smith has *likely*:
  - A. overestimated the project's cash flow by approximately \$310,000.
  - B. underestimated the project's net present value by approximately \$310,000.
  - C. overestimated the project's net present value by approximately \$190,000.

21. Steven Munn and David Hu are discussing potential capital projects for the Tryon Corporation. Hu is concerned about making capital budgeting mistakes, and he tells Munn that he wants to avoid such mistakes. Munn tells Hu not to worry and makes two statements:

*Statement 1:* Although we use templates for streamlining the evaluation of capital budgeting projects, the employees inputting the data in the template are highly trained to adjust the numbers that are put into the template for the specific project, which virtually eliminates template errors.

*Statement 2:* All projects we consider use Tryon Corp.'s weighted average cost of capital for the discount rate with an adjustment up or down reflecting the project's risk. By adjusting the discount rate for the risk of the project, we get a more accurate representation of the project's risk/reward tradeoff.

Should Hu say that Munn's statements are correct or incorrect?

- A. Both statements are correct.
- B. Only one of the statements is correct.
- C. Neither statement is correct.

Use the following information for Question 22 and 23.

Olympic Orthotics is investing in a €200 million capital project that is being depreciated on a straight-line basis to zero over the project's short 2-year life. The project will generate operating earnings before interest and taxes of €140 million for both years, and at the end of the project's 2-year life, the project will have a zero salvage value. Olympic Orthotics' WACC and cost of capital for the project is 15%, and the tax rate is 40%.

22. The economic income for Olympic Orthotics for years 1 and 2 is *closest* to:
- A. €45 million in year 1 and €69 million in year 2.
  - B. €45 million in year 1 and €24 million in year 2.
  - C. €54 million in year 1 and €69 million in year 2.
23. The economic profit for Olympic Orthotics in years 1 and 2 is *closest* to:
- A. €45 million in year 1 and €69 million in year 2.
  - B. €45 million in year 1 and €24 million in year 2.
  - C. €54 million in year 1 and €69 million in year 2.

24. Marybeth Krause has been asked by her employer to evaluate different valuation models for capital projects. Krause's report makes the following two comments:

*Comment 1:* The present value of future economic profit will be the same as the NPV found by discounted cash flow analysis in the basic capital budgeting approach if the WACC is used as the economic profit discount rate.

*Comment 2:* The residual income approach focuses only on returns to equity investors, and the proper discount rate to use for finding the NPV of the project based on this approach is the cost of equity.

Are Krause's two comments correct or incorrect?

- A. Both comments are correct.
  - B. Only one of the comments is correct.
  - C. Neither comment is correct.
25. A company is analyzing two projects. Project A has a project beta of 1.2, and Project B has a beta of 0.6. The company's weighted average cost of capital is 10%. The risk-free rate is 5%, and the market risk premium is 9%. If the company incorrectly uses the company's weighted average cost of capital to calculate the NPV of both projects, will it overestimate or underestimate the NPV?
- A. Overestimate NPV for both projects.
  - B. Underestimate NPV for both projects.
  - C. Overestimate one NPV, but not both projects.

## ANSWERS – CONCEPT CHECKERS

1. C Previous expenditures associated with a market test would be a sunk cost and should not be included.
2. B Capital budgeting analysis for expansion and replacement projects are not the same; change in working capital can be positive or negative; and replacement projects are mutually exclusive—B is the only correct statement.
3. B First-year depreciation =  $(\$60,000)(0.2) = \$12,000$ . Initial cash outlay =  $\$60,000 \text{ cost} - \$15,000 \text{ NWC inflow} = \$45,000 \text{ net outlay}$ .
4. C Year 1 operating cash flow =  $[\text{net income impact} \times (1 - t)] + (\text{depreciation} \times t) = (\$5,000)(0.6) + (\$60,000)(0.2)(0.4) = \$7,800$ . Terminal year cash flow (excluding that year's operating cash flow) = after-tax proceeds from sale of the new machine less working capital return =  $\$10,000 - [(\$10,000)(0.4)] - \$15,000 = -\$9,000$ .
5. A initial net investment =  $-\$60,000 + \$15,000 = -\$45,000$   
 annual depreciation =  $\$60,000/6 = \$10,000$   

$$\text{CF}(\text{years 1 through 6}) = \$5,000(1 - 0.4) + \$10,000(0.4) = \$7,000$$

$$\text{TNOCF}(\text{year 6}) = \$10,000 - [\$10,000(0.4)] - \$15,000 = -\$9,000$$

$$\text{NPV} = -\$45,000 + \$7,000/1.12 + \$7,000/1.12^2 + \$7,000/1.12^3 + \$7,000/1.12^4 + \$7,000/1.12^5 + (\$7,000 - \$9,000)/1.12^6 = -\$20,780$$
6. B (Purchase of new machine of  $-10,000$ ) + (sale of old  $6,000$ ) – [tax effect  $(6,000 - 2,000)(0.25)$ ] – (NWC  $3,000$  out  $1,000$  in) =  $-10,000 + 5,000 - 2,000 = -\$7,000$ .
7. B Statement 1 is incorrect. Depreciation reduces cash taxes paid, not interest expense. Statement 2 is correct. Accelerated depreciation methods applied for tax purposes result in higher tax savings and higher cash flows early in a project's life, which will serve to increase the project's NPV.
8. C Spang is incorrect with respect to both statements. All projects should *not* be discounted at the real interest rate. Discount rates should be matched up with cash flows so that real cash flows are discounted at the real interest rate and nominal cash flows are discounted at the nominal interest rate. The second statement is incorrect because it is rare for inflation to affect revenues and costs uniformly. The profits for a company will be better or worse than expected depending on how sales outputs or cost inputs are affected by inflation. Also, contracting with customers, suppliers, employees, and capital providers can all become more complicated as inflation rises.
9. B Using the replacement chain approach:  

$$\text{NPV Project A} = -100,000 + (75,000/1.10) + (75,000 - 100,000)/1.10^2 + 75,000/1.10^3 + 75,000/1.10^4 = \$55,095$$

$$\text{NPV Project B} = -100,000 + 50,000/1.10 + 50,000/1.10^2 + 50,000/1.10^3 + 50,000/1.10^4 = \$58,493$$

10. **A**  $EAA_A$ :  $PV=20,000$ ;  $N = 3$ ;  $I/Y = 12$ ; CPT PMT  $\rightarrow \$8,327$ .  $EAA_B$ :  $PV = 25,000$ ;  $N = 5$ ;  $I/Y = 12$ ; CPT PMT  $\rightarrow \$6,935$ . Note: take the highest EAA.
11. **A** The tax shield from the loss on the sale of the old equipment is equal to the loss times the marginal tax rate. The tax shield is treated as an initial cash inflow. Answer B describes a cash inflow (a tax savings).
12. **B** Statement 2 is incorrect because the analyst should use either the replacement chain or equivalent annual annuity methods to analyze mutually exclusive projects with unequal lives. Statement 1 is correct.
13. **A** The cost of debt is reflected in the WACC. All other statements are accurate.
14. **C** The project described has a production-flexibility option, which includes overtime for workers, producing a different product, or using different inputs. In any case, the use of real options offers flexibility that can improve the NPV estimates for individual projects.
15. **C** Scenario analysis uses best and worst case scenarios to determine the most likely outcome. The other statements are true.
16. **C** The combination of projects with the highest total NPV should be selected, subject to the constraint that the total investment required not exceed the allocated capital budget.
17. **B** Since the capital budget is only \$80,000, this is an example of capital rationing since Eldon has more profitable projects than it has capital. The objective here is to maximize the NPV within the budget, which means that Projects 2, 3, and 4 should be taken for a combined NPV of \$33,000. Note that even though money is left over with this combination, it has the highest total NPV of the answer choices listed. Choosing Projects 1, 3, and 5 uses the entire capital budget but results in a total NPV of only \$31,000. Choosing Projects 1, 3, and 4 would exceed the capital budget.



## ANSWERS – CHALLENGE PROBLEMS

18. A The expected annual after-tax operating cash flow is  $0.50(\$100,000) + 0.50(\$280,000) = \$190,000$ . The cash flows discounted at the 10% cost of capital for the project give an NPV of:

$$\text{NPV} = -\$500,000 + \sum_{t=1}^3 \frac{\$190,000}{1.10^t} = -\$27,498$$

19. B The optimal abandonment strategy would be to abandon the project in one year if the subsequent cash flows are worth less than the abandonment value. If at the end of the first year the low cash flow occurs, McCool can abandon the project, receive \$250,000 instead of \$173,554 (present value of \$100,000 over the next two years). If the high cash flow occurs, the present value of the cash flow for the remaining two years is \$485,950, so McCool would not want to abandon the project.

If the high cash flow occurs, the total present value of the project would be:

$$\text{NPV} = -\$500,000 + \sum_{t=1}^3 \frac{\$280,000}{1.10^t} = \$196,319$$

If the low cash flow occurs, McCool would receive the first year cash flow and the abandon value, and no further cash flows. In that case, the NPV would be:

$$\text{NPV} = -\$500,000 + \frac{\$100,000 + \$250,000}{1.10} = -\$181,818$$

With the abandonment option, the expected NPV is  $0.50(\$196,319) + 0.50(-\$181,818) = \$7,250$ . Note that the NPV was negative without the option but positive when the option is included in the analysis.

20. C By ignoring the initial \$500,000 cash outflow, she has overestimated project NPV by \$500,000. By ignoring the terminal cash inflow of \$500,000, she has underestimated project NPV by  $\frac{\$500,000}{1.10^5} \approx \$310,000$ .

The net effect is to overestimate NPV by  $\$500,000 - \$310,000 = \$190,000$ .

21. B Simply adjusting the numbers input into templates does not eliminate the possibility that the templates themselves may be incorrectly applied. Statement 1 is incorrect. Statement 2 is correct because a methodology is used that adjusts the discount rate for the risk of the project and does not simply use a single discount rate for all projects.

22. B First, determine the after-tax cash flow for years 1 and 2 as:

$$CF = (S - C - D)(1 - T) + D = €140(1 - 0.40) + €100 = €184$$

Note that EBIT is equal to  $(S - C - D)$ .

Next, determine the current market value of the project today and at the end of year 1 as:

$$\text{value today} = \frac{€184}{1.15} + \frac{€184}{1.15^2} = €299, \text{ value after year 1} = \frac{€184}{1.15} = €160$$

The economic income for years 1 and 2 are €45 million and €24 million respectively, as shown in the following table.

<i>(all figures in millions)</i>	<i>Year 1</i>	<i>Year 2</i>
Beginning market value	€299	€160
Ending market value	160	0
Change in market value	–139	–160
After-tax cash flow	184	184
<b>Economic income</b>	<b>€45</b>	<b>€24</b>
Economic rate of return	15%	15%

23. C Economic profit is calculated as  $\text{NOPAT} - \$\text{WACC} = \text{EBIT}(1 - T) - \$\text{WACC}$

$$\text{economic profit (year 1)} = €140 \text{ million}(1 - 0.4) - 0.15(€200 \text{ million}) = €54 \text{ million}$$

$$\text{economic profit (year 2)} = €140 \text{ million}(1 - 0.4) - 0.15(€100 \text{ million}) = €69 \text{ million}$$

24. A Both of Krause's comments are correct statements.

25. A  $R_{\text{project A}} = 5\% + 1.2(9\%) = 15.80\%$

$$R_{\text{project B}} = 5\% + 0.6(9\%) = 10.40\%$$

If the company uses the overall WACC of 10%, it will overestimate the value of both projects because the WACC is too low to reflect the higher risk of each project.

# CAPITAL STRUCTURE

Study Session 8

## EXAM FOCUS

This topic review explores various theories related to how a firm chooses its proportions of debt and equity financing. You should be able to discuss the impact of leverage on a firm's risk, return on equity, and share price. You should know the concepts underlying MM's propositions, the pecking order theory, and the static trade-off theory. You should also know what factors cause differences in capital structures across countries.

## CAPITAL STRUCTURE THEORY

### WARM-UP: OVERVIEW OF THE CAPITAL STRUCTURE THEORIES

As you read through the capital structure theory material, observe that the progression is from MM 1958 (no taxes, no costs of financial distress) to MM 1963 (with taxes, no costs of financial distress) to the static trade-off theory (with taxes and with costs of financial distress). Candidates often wonder, "Why do we need to know MM?" because the assumptions of no taxes and no financial distress costs are so clearly at variance with reality.

The answer is that by starting with MM 1958, we are laying the foundation that explains the fundamental relationship between capital structure and cost of equity. In moving to MM 1963, we are able to see how introducing taxes affects the cost of capital and firm value. Without this prior knowledge, it would not be possible to understand the static trade-off theory, which is built on the foundation provided by the MM theory, and is a realistic explanation of the relationship between capital structure and firm value. Remember, the goal of managers in a capital structure decision is to minimize the weighted average cost of capital (and thereby maximize the value of the company).

**LOS 30.a: Discuss the Modigliani–Miller propositions concerning capital structure, including the impact of leverage, taxes, financial distress, agency costs, and asymmetric information on a company's cost of equity, cost of capital, and optimal capital structure.**

### MM Proposition I (No Taxes): The Capital Structure Irrelevance Proposition

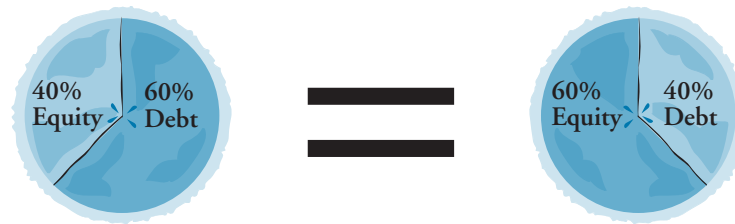
In 1958, Professors Franco Modigliani and Merton Miller (MM) published their seminal work on capital structure theory. Under a very restrictive set of assumptions, *MM proved that the value of a firm is unaffected by its capital structure.* To summarize, MM's results suggest that in a perfect world, it does not matter how a firm finances its operations.

Thus, capital structure is irrelevant. MM's study is based on the following simplifying assumptions:

- *Capital markets are perfectly competitive:* there are no transactions costs, taxes, or bankruptcy costs.
- *Investors have homogeneous expectations:* they have the same expectations with respect to cash flows generated by the firm.
- *Riskless borrowing and lending:* investors can borrow/lend at the risk-free rate.
- *No agency costs:* no conflict of interest between managers and shareholders.
- *Investment decisions are unaffected by financing decisions:* operating income is independent of how assets are financed.

In the MM no-tax world, the value of a company is not affected by its capital structure. We can explain MM's capital structure irrelevance proposition in terms of a pie. That is, the size (value) of the pie (firm) depends not on how it is sliced (the capital structure), but rather on the size of the pie pan (the firm's asset base). So with a pie pan of a certain size, the value of a firm's assets will be the same, no matter how a firm finances (slices) it. This idea is illustrated in Figure 1.

Figure 1: MM Capital Structure Irrelevance Proposition



Consider why the pie analogy holds true. The operating earnings (EBIT) of a firm are available to all providers of capital. In a company with no debt, all of the operating earnings are available to equityholders, and the value of the company is the discounted present value of these earnings. If a company is partially financed by debt, operating earnings are split between debtholders and equityholders. Under the assumption of perfect markets, the sum of a firm's debt and equity should equal the value of the all-equity company so the value of the company is unchanged. Another way of stating this is that the value of the company with leverage is equal to the value of the company without leverage:

$$V_L = V_U$$

where:

$V_L$  = value of levered firm

$V_U$  = value of unlevered firm

Given our assumptions, an investor can have homemade leverage. He can substitute his own leverage (in addition to owning stock) for company's leverage. As this process is assumed to be costless, a company's capital structure is irrelevant in the presence of perfect capital markets.

## MM Proposition II (No Taxes): Cost of Equity and Leverage Proposition

MM's second proposition with no taxes states that *the cost of equity increases linearly as a company increases its proportion of debt financing*. Again, MM assume a perfect market where there are no taxes, no cost of bankruptcy, and homogeneous expectations. According to their proposition, debtholders have a priority claim on assets and income, which makes the cost of debt lower than the cost of equity. However, as companies increase their use of debt, the risk to equityholders increases, which in turn increases the cost of equity. Therefore, the benefits of using a larger proportion of debt as a cheaper source of financing are offset by the rise in the cost of equity, resulting in no change in the firm's WACC.

We can see this by using the weighted average cost of capital (WACC) formula (assuming the marginal tax rate is zero) and solving for the cost of equity.

$$r_e = r_0 + \frac{D}{E}(r_0 - r_d)$$

where:

$r_e$  = required rate of return on equity, or cost of equity

$r_0$  = company unlevered cost of capital (i.e., assume no leverage)

$r_d$  = required rate of return on borrowings, or cost of debt

$\frac{D}{E}$  = debt-to-equity ratio

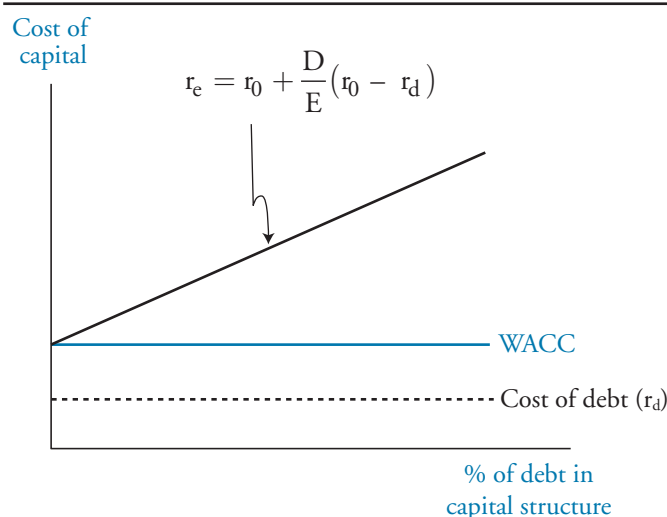
As leverage increases (i.e., the debt-to-equity ratio rises), the cost of equity increases, but WACC and the cost of debt are unchanged.



*Professor's Note: In this framework, WACC is also called the return on assets and denoted  $r_a$ .*

This concept is illustrated in Figure 2.

**Figure 2: MM Proposition II (No Taxes)**



MM's second proposition supports their first proposition. Because the benefits of lower cost debt are offset by the increased cost of equity, the relative amount of debt versus equity in the firm's capital structure does not affect the overall value of the firm.

### MM Proposition I (With Taxes): Value is Maximized at 100% Debt

**Tax shield provided by debt.** Removing MM's assumption that there are no taxes changes the result of their propositions regarding capital structure irrelevance. Under the tax code of most countries, interest payments are a pretax expense and are therefore tax deductible, while dividends are paid on an after-tax basis. The differential tax treatment encourages firms to use debt financing because debt provides a **tax shield** that adds to the value of the company. The tax shield is equal to the marginal tax rate multiplied by the amount of debt in the capital structure. In other words, the value of a levered firm is equal to the value of an unlevered firm plus the tax shield.

$$V_L = V_U + (t \times d)$$

where:

$V_L$  = value of levered firm

$V_U$  = value of unlevered firm

$t$  = marginal tax rate

$d$  = value of debt in capital structure

If we maintain MM's other assumptions (i.e., no cost of bankruptcy), the value of the company increases with increasing levels of debt, *and the optimal capital structure is 100% debt.*

### MM Proposition II (With Taxes): WACC is Minimized at 100% Debt

If we assume the marginal tax rate is not zero and then use the WACC formula to solve for return on equity, we get MM Proposition II (With Taxes):

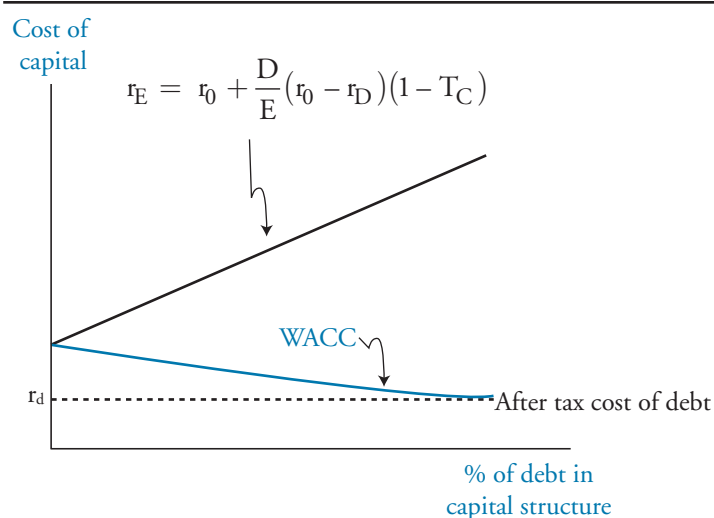
$$r_E = r_0 + \frac{D}{E}(r_0 - r_D)(1 - T_C)$$

where:

$T_C$  = tax rate

Figure 3 shows that the tax shield provided by debt causes the WACC to decline as leverage increases. The value of the firm is maximized at the point where the WACC is minimized, which is 100% debt.

Figure 3: MM Proposition II (With Taxes)



### Costs and Their Potential Effect on the Capital Structure

**Costs of financial distress** are the increased costs a company faces when earnings decline and the firm has trouble paying its fixed financing costs (i.e., interest on debt). The *expected* costs of financial distress for a firm have two components:

- *Costs of financial distress and bankruptcy* can be direct or indirect. Direct costs of financial distress include the cash expenses associated with the bankruptcy, such as legal fees and administrative fees. Indirect costs include foregone investment opportunities and the costs that result from losing the trust of customers, creditors, suppliers, and employees.
- *Probability of financial distress* is related to the firm's use of operating and financial leverage. In general, higher amounts of leverage result in a higher probability of financial distress. Other factors to consider include the quality of a firm's management and the company's corporate governance structure; lower quality management and corporate governance lead to a higher probability of financial distress.

Higher expected costs of financial distress tend to discourage companies from using large amounts of debt in their capital structure, all else equal.

**Agency costs of equity** refer to the costs associated with the conflicts of interest between managers and owners. Managers who do not have a stake in the company do not bear the costs associated with excessive compensation or taking on too much (or too little) risk. Because shareholders are aware of this conflict, they will take steps to minimize these costs, and the net result is called the **net agency cost of equity**. Net agency costs of equity have three components:

- *Monitoring costs* are the costs associated with supervising management and include the expenses associated with making reports to shareholders and paying the board of directors. Note that strong corporate governance systems will reduce monitoring costs.

- *Bonding costs* are assumed by management to assure shareholders that the managers are working in the shareholders' best interest. Examples of bonding costs include the premiums for insurance to guarantee performance and implicit costs associated with non-compete agreements.
- *Residual losses* may occur even with adequate monitoring and bonding provisions because such provisions do not provide a perfect guarantee.

According to agency theory, the use of debt forces managers to be disciplined with regard to how they spend cash because they have less free cash flow to use for their own benefit. It follows that greater amounts of financial leverage tend to reduce agency costs.



*Professor's Note: Agency relationships are discussed more in depth in the Corporate Governance topic review.*

**Costs of asymmetric information** refer to costs resulting from the fact that managers typically have more information about a company's prospects and future performance than owners or creditors. Firms with complex products or little transparency in financial statements tend to have higher costs of asymmetric information, which results in higher required returns on debt and equity capital.

Because shareholders and creditors are aware that the asymmetric information problems exist, these investors will look for management behavior that "signals" what knowledge management may have. Specifically, management's choice of debt or equity financing may provide a signal regarding management's opinion of the firm's future prospects.

- Taking on the commitment to make fixed interest payments through debt financing sends a signal that management has confidence in the firm's ability to make these payments in the future.
- Issuing equity is typically viewed as a negative signal that managers believe a firm's stock is overvalued.

The cost of asymmetric information increases as the proportion of equity in the capital structure increases.

**Pecking order theory**, based on asymmetric information, is related to the *signals* management sends to investors through its financing choices. According to pecking order theory, managers prefer to make financing choices that are least likely to send signals to investors. Financing choices under pecking order theory follow a hierarchy based on visibility to investors with internally generated capital being the most preferred, debt being the next best choice, and external equity being the least preferred financing option.

In other words, the pecking order (from most favored to least favored) is:

- Internally generated equity (i.e., retained earnings).
- Debt.
- External equity (i.e., newly issued shares).

Therefore, the pecking order theory predicts that the capital structure is a by-product of the individual financing decisions.



## Static Trade-Off Theory

The **static trade-off theory** seeks to balance the costs of financial distress with the tax shield benefits from using debt. Under the static trade-off theory, there is an optimal capital structure that has an optimal proportion of debt.

If we remove the assumption that there are no costs of financial distress, there comes a point where the additional value added from the debt tax shield is exceeded by the value-reducing costs of financial distress from the additional borrowing. This point represents the optimal capital structure for a firm where the WACC is minimized and the value of the firm is maximized.

Accounting for the costs of financial distress, the expression for the value of a levered firm becomes:

$$V_L = V_U + (t \times d) - PV(\text{costs of financial distress})$$

Figure 4 shows that the after-tax cost of debt has an upward slope due to the increasing costs of financial distress that come with additional leverage. As the cost of debt increases, the cost of equity also increases because some of the costs of financial distress are effectively borne by equityholders. The optimal proportion of debt is reached at the point when the marginal benefit provided by the tax shield of taking on additional debt is equal to the marginal costs of financial distress incurred from the additional debt. This point also represents the firm's optimal capital structure because it is the point that minimizes the firm's WACC and therefore maximizes the value of the firm.

**Figure 4: Static Trade-Off Theory: Cost of Capital vs. Capital Structure**

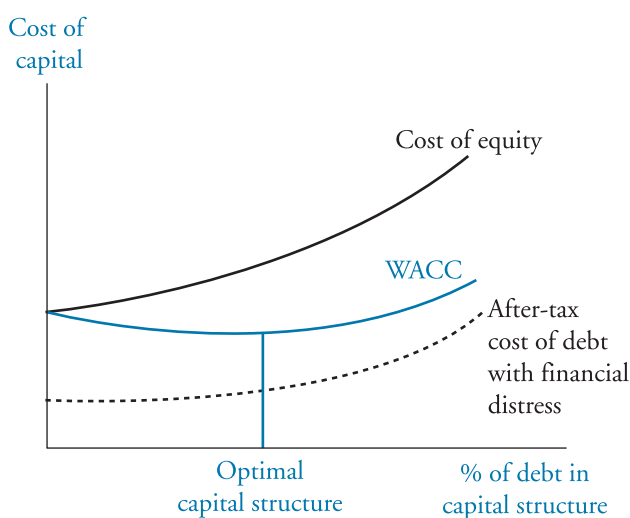
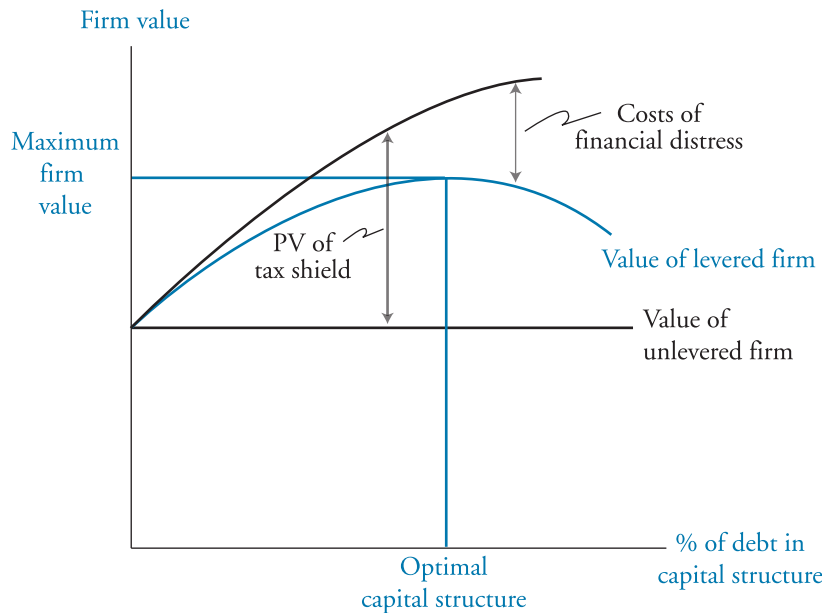


Figure 5 illustrates the theory as the trade-off between firm value and capital structure.

Figure 5: Static Trade-Off Theory: Firm Value vs. Capital Structure



Note that every firm will have a different optimal capital structure that depends on each firm's operating risk, sales risk, tax situation, corporate governance, industry influences, and other factors.

### Implications for Managerial Decision Making

**MM's propositions with no taxes** follow a restrictive set of assumptions in that there are no taxes and no costs associated with financial distress. MM's first proposition says that the capital structure of a company is irrelevant because the value of the company is determined by the discounted present value of its operating earnings. MM's second proposition states that increasing the use of cheaper debt financing will increase the firm's cost of equity, resulting in a zero net change in the firm's WACC. The implication for managers' decisions regarding capital structure under both propositions is that capital structure is irrelevant.

**MM's propositions with taxes** says that the tax shield provided by interest expense makes borrowing valuable; the value of the firm is maximized; and the WACC is minimized, at 100% debt.

**Static trade-off theory** recognizes that there are tax benefits associated with issuing debt because interest expense is tax deductible, but increasing the use of debt also increases the costs of financial distress. At some point, the costs of financial distress will exceed the tax benefits of debt. Managers following the static trade-off approach will seek to balance the benefits of debt with the costs of financial distress and identify an optimal capital structure.

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**LOS 30.b: Explain the target capital structure and why actual capital structure may fluctuate around the target.**

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The **target capital structure** is the structure that the firm uses over time when making decisions about how to raise additional capital. Management's use of a target capital structure reflects the knowledge that the firm has an optimal capital structure. For managers trying to maximize the value of the firm, the target capital structure will be the same as the optimal capital structure.

In practice, the firm's actual capital structure tends to fluctuate around the target capital structure for two reasons:

- *Management may choose to exploit opportunities in a specific financing source.* For example, a temporary rise in the firm's stock price may create a good opportunity to issue additional equity, which would result in a higher percentage of equity than the target.
- *Market value fluctuations will occur.* Changes in stock and bond markets will cause fluctuations in the firm's stock and bond prices. Because capital structure weights are determined by market values, market fluctuations may cause the firm's actual capital structure to vary from the target.

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**LOS 30.c: Review the role of debt ratings in capital structure policy.**

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**Debt ratings** from ratings agencies such as Standard & Poor's and Moody's reflect the creditworthiness of a company's debt. The agencies perform an extensive analysis of a company's ability to make interest and principal payments and assign a rating based on the bond's default risk. Lower debt ratings denote higher levels of default risk for both shareholders and bondholders, who in turn demand higher returns on their capital.

Because the cost of capital is tied to debt ratings, many managers have goals for maintaining certain minimum debt ratings when determining their capital structure policies. Managers prefer to have the highest rating possible because higher ratings mean cheaper financing costs. If a bond rating drops from investment grade to speculative grade, the cost of debt increases considerably. Historically, the difference in yield between a AAA-rated bond and a BBB-rated bond (the highest and lowest investment grade categories) has averaged 100 basis points, although this spread can be higher or lower depending on economic conditions and investor willingness to take on risk.

The rating categories for Moody's and Standard & Poor's are shown in Figure 6.

Figure 6: Bond Ratings from Moody's and Standard &amp; Poor's

	<i>Moody's</i>	<i>Standard &amp; Poor's</i>	<i>Grade</i>
Highest quality	Aaa	AAA	Investment grade
High quality	Aa	AA	
Upper medium grade	A	A	
Medium grade	Baa	BBB	
Speculative	Ba	BB	Speculative grade
Highly speculative	B	B	
Substantial risk	Caa	CCC	
Extremely speculative	Ca		
Possibly in default	C		
Default		D	

#### LOS 30.d: Explain the factors an analyst should consider in evaluating the impact of capital structure policy on valuation.

When evaluating a company's capital structure, the analyst should consider the following factors:

- Changes in the company's capital structure over time.
- Capital structure of competitors with similar business risk.
- Company-specific factors (e.g., quality of corporate governance). Recall that better corporate governance systems will reduce agency costs.

Scenario analysis is a useful tool to determine whether management's current capital structure policy is maximizing the value of the firm. Starting with the firm's current capital structure, an analyst can assess how changes in the firm's debt ratio may reduce the WACC and then evaluate what happens to the firm's value if the company moves toward its optimal capital structure.

#### LOS 30.e: Discuss international differences in financial leverage and the implications for investment analysis.

For international firms, country-specific factors may have a significant impact on a firm's capital structure policy. Observations regarding international differences in financial leverage include the following:

- *Total debt.* Companies in Japan, Italy, and France tend to have more total debt in their capital structure than firms in the United States and the U.K.
- *Debt maturity.* Companies in North America tend to use longer maturity debt than companies in Japan.
- *Emerging market differences.* Companies in developed countries tend to use more total debt and use longer maturity debt than firms in emerging markets.

The factors that explain the majority of the differences in capital structure across countries fall into three broad categories: institutional and legal factors, financial markets and banking system factors, and macroeconomic factors.

### Institutional and Legal Factors

- *Strength of legal system.* Firms operating in countries with weak legal systems tend to have greater agency costs due to the lack of legal protection for investors. These firms tend to use more leverage in their capital structure and have a greater reliance on short-term debt. By contrast, firms operating in countries with strong legal systems tend to use less debt overall, and the debt used tends to have longer maturities.
- *Information asymmetry.* A high level of information asymmetry between managers and investors encourages managers to use more debt in the capital structure. In countries where auditors and financial analysts have a greater presence, information asymmetries are reduced. Increased transparency tends to result in lower financial leverage.
- *Taxes.* The tax shield provided by debt encourages the use of debt financing; however, this relationship changes somewhat if dividends are taxed at a more favorable rate than interest income. A favorable tax rate for dividends should reduce the return that investors require on equity capital, thus reducing the cost of equity for the firm. The lower cost of equity will cause firms operating in countries with lower tax rates on dividend income to have less debt in their capital structure.

### Financial Markets and Banking System Factors

- *Liquidity of capital markets.* Companies operating in countries with larger and more liquid capital markets tend to use longer maturity debt than firms in countries with less liquid capital markets.
- *Reliance on banking system.* Companies operating in countries that are more reliant on the banking system than corporate bond markets as a source of corporate borrowing tend to be more highly leveraged.
- *Institutional investor presence.* A greater prevalence of large institutional investors in a country may affect firms' capital structure as well. Institutional investors may have preferred maturity ranges for their debt investments (preferred habitat). For example, life insurance companies and pension plans may exhibit a preference for long-term debt securities relative to short-term debt. There is some evidence that firms in countries with active institutional investors issue relatively more long-term debt compared to short-term debt. We may also observe marginally lower debt-to-equity ratios in these countries.



*Professor's Note: The concept of institutional investors preferring longer maturity debt is similar to the preferred habitat theory for the shape of the yield curve discussed in Study Session 14.*

### Macroeconomic Factors

- *Inflation.* Higher inflation reduces the value to investors of fixed interest payments. As a result, firms operating in countries with high inflation tend to use less debt financing, and the debt used has a shorter maturity.
- *GDP growth.* Firms operating in countries with higher GDP growth tend to use longer maturity debt.

The impact of country-specific factors on leverage is summarized in Figure 7.

**Figure 7: Impact of Country-Specific Factors on Capital Structure**

<i>Country-Specific Factor</i>	<i>Use of Total Debt</i>	<i>Maturity of Debt</i>
<u><i>Institutional and Legal Factors</i></u>		
Strong legal system	Lower	Longer
Less information asymmetry	Lower	Longer
Favorable tax rates on dividends	Lower	N/A
Common law as opposed to civil law	Lower	Longer
<u><i>Financial Market Factors</i></u>		
More liquid stock and bond markets	N/A	Longer
Greater reliance on banking system	Higher	N/A
Greater institutional investor presence	Lower	Longer
<u><i>Macroeconomic Factors</i></u>		
Higher inflation	Lower	Shorter
Higher GDP growth	Lower	Longer

## KEY CONCEPTS

### LOS 30.a

Under the assumptions of no taxes, transaction costs, or bankruptcy costs, the value of the firm is unaffected by leverage changes. MM Proposition I (No Taxes) says capital structure is irrelevant.

MM Proposition II (No Taxes) concerning the cost of equity and leverage says that increasing the use of cheaper debt financing serves to increase the cost of equity, resulting in a zero net change in the company's WACC. Again, the implication is that capital structure is irrelevant.

According to MM Proposition II (With Taxes), if the assumption regarding no taxes is relaxed, the tax deductibility of interest payments creates a tax shield that adds value to the firm, and the optimal capital structure is achieved with 100% debt. MM Proposition II (With Taxes) says that WACC is minimized at 100% debt.

Costs of financial distress are the increased costs companies face when earnings decline and the company has trouble paying its fixed costs. Higher amounts of leverage result in greater expected costs of financial distress.

The net agency costs of equity are the costs associated with the conflict of interest between a company's managers and owners and consist of three components:

- Monitoring costs.
- Bonding costs.
- Residual losses.

Costs of asymmetric information result from managers having more information about a firm than investors. The cost of asymmetric information increases as more equity is used in capital structure. Hence the pecking order theory. Pecking order theory states that managers prefer financing choices that send the least visible signal to investors, with internal capital being most preferred, debt being next, and raising equity externally the least preferred method of financing.

The static trade-off theory seeks to balance the costs of financial distress with the tax shield benefits from using debt and states that there is an optimal capital structure that has an optimal proportion of debt. Removing both MM's assumptions of no taxes and no costs of financial distress, there comes a point where the incremental value added by the tax shield is exceeded by the additional expected costs of financial distress, and this point represents the optimal capital structure.

### LOS 30.b

The target capital structure is the structure that the firm uses over time when making capital structure decisions. In practice, the actual capital structure will fluctuate around the target due to management's exploitation of market opportunities and market value fluctuations.

**LOS 30.c**

Managers typically have goals to maintain a certain minimum credit rating when determining their capital structure policies because the cost of capital is tied to debt ratings; lower ratings translate into higher costs of capital.

**LOS 30.d**

Factors an analyst should consider when evaluating a firm's capital structure include:

- Changes in the firm's capital structure over time.
- Capital structure of competitors with similar business risk.
- Factors affecting agency costs such as the quality of corporate governance.

**LOS 30.e**

Major factors that influence international differences in financial leverage include:

- Institutional, legal, and taxation factors.
- Financial market and banking system factors.
- Macroeconomic factors.



## CONCEPT CHECKERS

1. The optimal capital structure:
  - A. maximizes firm value and minimizes the weighted average cost of capital.
  - B. minimizes the interest rate on debt and maximizes expected earnings per share.
  - C. maximizes expected earnings per share and maximizes the price per share of common stock.
2. Which of the following statements regarding Modigliani and Miller's propositions (assuming perfect capital markets and homogenous expectations) is *most accurate*?
  - A. Firm value is maximized with a capital structure consisting of 100% equity.
  - B. The cost of equity increases as the firm increases its financial leverage.
  - C. The use of debt financing increases the firm's weighted average cost of capital.
3. Which of the following is *least likely* to be a component of a firm's expected cost of financial distress?
  - A. Legal and administrative fees associated with bankruptcy.
  - B. Cost of insurance premiums to guarantee management performance.
  - C. Loss of trust from customers.

Use the following information to answer Questions 4 through 6.

Darren Munn recently came back from a conference titled Capital Structure Theory and was extremely excited about what he learned concerning Modigliani and Miller's capital structure propositions. Munn has been trying to choose between three potential capital structures for his firm, MunnMart, and believes that Modigliani and Miller's work may guide him in the right direction. The capital structures Munn is considering are:

- 100% equity.
  - 50% equity and 50% debt.
  - 100% debt.
4. If Munn uses Modigliani and Miller's propositions and includes all of their assumptions including the assumption of no taxes, which capital structure is Munn *most likely* to choose?
    - A. 100% equity.
    - B. 100% debt.
    - C. It does not matter which structure he chooses.
  5. If Munn uses Modigliani and Miller's propositions assuming the firm pays taxes, which capital structure is Munn *most likely* to choose?
    - A. 100% equity.
    - B. 100% debt.
    - C. It does not matter which structure he chooses.

6. At the conference, Munn also learned about the static trade-off theory. If Munn uses the static trade-off approach, which capital structure is Munn *most likely* to choose?
- A. Either 100% equity or 100% debt.
  - B. 50% equity and 50% debt.
  - C. It does not matter which structure he chooses.

Use the following information to answer Questions 7 and 8.

Firms operating in the countries of Remus and Romulus have very different capital structures. Firms operating in Remus have low levels of leverage, and the debt they do have in their capital structure tends to have a long maturity. Firms operating in Romulus have high debt-to-capital ratios with shorter maturity debt.

7. Remus *most likely* has:
- A. a small institutional investor presence.
  - B. a strong legal system.
  - C. relatively illiquid stock and bond markets.
8. Romulus *most likely* has:
- A. few analysts and auditors working in the country.
  - B. a low reliance on the banking system for raising debt capital.
  - C. favorable tax rates on dividends.

## CHALLENGE PROBLEMS

Use the following information to answer Questions 9 and 10.

Garry Bartolet, the Chief Financial Officer for the Gendron Corporation, is leading a meeting to discuss financing options for the firm. At the meeting, Mary Iwinski, a project manager with Gendron, makes the following statements:

*Statement 1:* Raising additional debt capital is likely to be more beneficial for our firm than issuing new equity because issuing debt would give a signal to our shareholders that we have confidence in our firm's ability to make future debt service payments.

*Statement 2:* We need to conduct a careful analysis to decide how much debt to issue because increasing our financial leverage could either increase or decrease Gendron's value.

*Statement 3:* If our corporate tax rate increases from 25% to 30%, our weighted average cost of capital is likely to decline.

*Statement 4:* What is happening in the stock or bond markets is irrelevant to our decisions for how to raise capital. We should always seek to raise capital in the exact proportions called for by our optimal capital structure.

9. Iwinski's Statements 1 and 2, respectively, correspond *most closely* to which of the following theories regarding capital structure?

Statement 1

Statement 2

- |                            |                         |
|----------------------------|-------------------------|
| A. MM's propositions       | Pecking order theory    |
| B. Static trade-off theory | MM's propositions       |
| C. Pecking order theory    | Static trade-off theory |

10. Are Iwinski's Statements 3 and 4 correct or incorrect?

- A. Both statements are correct.
- B. Only one of the statements is correct.
- C. Neither statement is correct.

11. Barney Flint, CFA, is the CFO of Bee Heaven, a publicly traded chain of flower shops. Bee Heaven is currently rated A but is likely to drop to BBB once the disappointing results of an ill-considered merger are released to the public. Flint receives the following quote of credit spreads:

- Treasuries      6.00%
- AAA              14bp
- AA               29bp
- A                 63bp
- BBB             108bp
- BB               197bp
- B                 305bp

Flint is concerned that the \$10 million annual pay 20-year bonds Bee Heaven expects to issue next month will now be more expensive. The consequences of more expensive credit are *least likely* to:

- A. eliminate several planned expansion projects.
- B. invalidate existing bond covenants.
- C. impact agency costs.

12. A bond analyst is interested in Bee Heaven's upcoming bond offering; when considering capital structure policy, she should consider each of the following except:

- A. changes in the company's capital structure over time.
- B. factors affecting agency costs, such as quality of corporate governance.
- C. management's mandatory scenario analysis disclosure in the annual report.

## ANSWERS – CONCEPT CHECKERS

1. **A** The optimal capital structure minimizes the firm's WACC and maximizes the firm's value (stock price).
2. **B** MM's Proposition I (No Taxes) states that the cost of equity increases linearly as a company increases its proportion of debt financing. Because debt is cheaper than equity, the net result is a zero change in the firm's WACC. The other statements are incorrect. Under MM's Proposition I (No Taxes), capital structure is irrelevant because value is based on operating cash flows.
3. **B** The cost of insurance premiums to guarantee management performance is an example of a bonding cost associated with the net agency cost of equity. The expected costs of financial distress for a firm are based on direct costs such as fees associated with bankruptcy, indirect costs such as loss of trust from customers and suppliers, and the probability of financial distress associated with operating and financial leverage.
4. **C** Modigliani and Miller's original study was based on the assumption of perfect markets with no taxes and no costs of financial distress. Their conclusion [MM Proposition I (No Taxes)] was that under such assumptions, capital structure has no impact on firm value.
5. **B** MM Proposition I with taxes concludes that the optimal capital structure is 100% debt. This is because the tax deductibility of interest payments provides a tax shield that adds value to the firm, and the value of the tax shield is maximized with 100% debt.
6. **B** The static trade-off theory seeks to balance the costs of financial distress with the tax benefits provided by debt and states that there is some optimal capital structure with an optimal proportion of debt. Given Munn's choices, the 50% debt, 50% equity choice is most likely to provide this balance.
7. **B** Countries where companies have low levels of debt with long maturities in their capital structures tend to have a strong legal system. A small institutional investor presence, illiquid capital markets, and high inflation tend to be associated with either higher leverage or shorter maturity debt.
8. **A** A lack of analysts and auditors tends to increase information asymmetry, which leads to higher debt usage and shorter debt maturities. Note that a low reliance on the banking system, favorable dividend tax rates, and high GDP growth tend to be associated with either lower debt ratios or the use of longer maturity debt.

## ANSWERS – CHALLENGE PROBLEMS

9. **C** Iwinski's Statement 1 is indicative of the pecking order theory, which states that managers prefer financing choices that send the least visible signal to investors, with internal capital being most preferred, debt being next, and raising external equity the least preferred method of financing.

Iwinski's Statement 2 is indicative of the static trade-off theory. Additional leverage could increase or decrease the value of the firm depending on the relationship between the additional tax benefits of debt and the additional costs of financial distress. The key to static trade-off theory is to find the point where the marginal costs and benefits of additional debt balance, which is the optimal capital structure.

10. **B** Statement 3 is correct. The cost of debt is measured on an after-tax basis, and the higher the tax rate, the greater the tax shield benefits from using debt. Therefore, the WACC will decrease and firm value will increase, all else equal.

Statement 4 is incorrect. A firm's target capital structure is best described as a *moving target* where the actual capital structure will fluctuate around the optimal structure. One of the reasons why the actual capital structure may not match the target capital structure is that the financial markets may offer an opportunity to raise cheap debt or equity capital, in which case it makes sense to deviate slightly from the target.

11. **B** The drop in the bond rating may impact bond covenants but will not invalidate them. Bond covenants are discussed further in the debt securities topic reviews. Higher interest costs will increase WACC, making some borderline projects unviable. Agency relationships/costs present are likely to be affected in some way by the adverse change in credit rating.
12. **C** Management is not required to perform or disclose a scenario analysis of capital structure. The analyst may, however, find this tool useful. A capital structure policy evaluation should consider changes in the company's capital structure over time, capital structure of competitors with similar business risk, and factors affecting agency costs, such as quality of corporate governance.

# DIVIDENDS AND SHARE REPURCHASES: ANALYSIS

Study Session 8

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## EXAM FOCUS

The focus of the Level 2 exam is valuation, so pay close attention to the theories that explain how dividend policy affects company value and the signals investors get from dividend changes. Payout policy is broader than dividend policy as it includes other means (e.g., special dividends, stock repurchases, etc.) by which companies can pay out cash to stockholders. In recent years, firms have announced plans to repurchase record numbers of shares, making this an important and timely topic. You should have a basic understanding of the factors that affect a firm's payout policy and be able to analyze the sustainability of dividends using coverage ratios.

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**LOS 31.a: Compare and contrast theories of dividend policy, and explain the implications of each for share value given a description of a corporate dividend action.**

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**Dividend irrelevance.** Merton Miller and Franco Modigliani (MM) maintain that *dividend policy* is irrelevant, as it has no effect on the price of a firm's stock or its cost of capital. MM's argument of dividend irrelevance is based on their concept of *homemade dividends*. Assume, for example, that you are a stockholder and you don't like the firm's dividend policy. If the firm's cash dividend is too big, you can just take the excess cash received and use it to buy more of the firm's stock. If the cash dividend you received was too small, you can just sell a little bit of your stock in the firm to get the cash flow you want. In either case, the combination of the value of your investment in the firm and your cash in hand will be the same.

You should note that the dividend irrelevance theory holds only in a perfect world with no taxes, no brokerage costs, and infinitely divisible shares. You should also note that the MM discussion pertains to the firm's total *payout policy* (rather than to the narrower dividend policy).

**Bird-in-hand argument for dividend policy.** When MM conclude that dividends are irrelevant, they mean that investors don't care about the firm's dividend policy since they can create their own. If they don't care, the firm's dividend policy will not affect the firm's stock price and, consequently, dividend policy will not affect the firm's required rate of return on equity capital ( $r_s$ ). Myron Gordon and John Lintner, however, argue that  $r_s$  decreases as the dividend payout increases. Why? Because investors are less certain of receiving future capital gains from the reinvested retained earnings than they are of receiving current (and therefore certain) dividend payments. The main argument of Gordon and Lintner is that investors place a higher value on a dollar of dividends that they are certain to receive than on a dollar of *expected* capital gains. They base this

argument on the fact that, when measuring total return, the dividend yield component,  $D_1 / P_0$ , has less risk than the growth component  $g$ .



*Professor's Note: The Gordon/Lintner argument is called the bird-in-the-hand-theory based on the old expression: a "bird in the hand" (dividends) is worth two in the bush (expected capital gains).*

**Tax aversion.** In many countries, dividends have historically been taxed at higher rates than capital gains. In the 1970s, U.S. tax rates on dividend income were as high as 70%, while the taxes on capital gains were 35%. In the late 1990s, the rates were much lower, but the same general relationship was still in place. Dividends were taxed as ordinary income with rates as high as 39.1%, while long-term capital gains were taxed at 20%. Under such a situation, according to the tax-aversion theory, investors will prefer to *not* receive dividends due to their higher tax rates. Taken to the extreme, the tax-aversion theory implies that investors would want companies to have a zero dividend payout ratio so that they will not be burdened with higher tax rates.

In the real world, tax laws often prevent companies from accumulating excess earnings, making dividend payments necessary. Also note that in 2003, tax laws in the United States changed so that dividends and long-term capital gains are both taxed at the same 15% rate.

**Conclusions from the three theories.** The results of empirical tests are unclear as to which of these theories best explains the empirical observations of dividend policy. Research suggests that higher tax rates do result in lower dividend payouts. In the United States, however, the change in tax law that put dividends and capital gains on common ground is likely to make the tax aversion theory irrelevant. There is empirical support for the "bird-in-the-hand" theory as some companies that pay dividends are perceived as less risky and specific groups of investors do prefer dividend paying stocks. MM counter this argument by saying that different dividend policies appeal to different clienteles, and that since all types of clients are active in the marketplace, dividend policy has no effect on company value if all clienteles are satisfied.

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**LOS 31.b: Discuss the types of information (signals) that dividend initiations, increases, decreases, and omissions may convey.**

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**Information asymmetry** refers to differences in information available to a company's board and management (insiders) as compared to the investors (outsiders). Dividends convey more credible information to the investors as compared to plain statements. This is so because dividends entail actual cash flow and are expected to be "sticky" (continue in the future). Companies refrain from increasing dividends unless they expect to continue to pay out the higher levels in the future. Similarly, companies loathe cutting dividends unless they expect that the lower levels of dividends reflect long-run poorer prospects of the company in the future.

The information conveyed by **dividend initiation** is ambiguous. On one hand, a dividend initiation could mean that a company is optimistic about the future and is sharing its wealth with stockholders—a positive signal. On the other hand,

initiating a dividend could mean that a company has a lack of profitable reinvestment opportunities—a negative signal.

An **unexpected dividend increase** can signal to investors that a company's future business prospects are strong and that managers will share the success with shareholders. Studies have found that companies with a long history of dividend increases, such as GE and Exxon Mobil, are dominant in their industries and have high returns on assets and low debt ratios.

**Unexpected dividend decreases or omissions** are typically negative signals that the business is in trouble and that management does not believe that the current dividend payment can be maintained. In rare instances, however, a dividend decrease or omission could be a positive sign. Management may believe that profitable investment opportunities are available and that shareholders would ultimately receive a greater benefit by having earnings reinvested in the company rather than being paid out as dividends.

## OTHER DIVIDEND POLICY THEORIES

### LOS 31.c: Illustrate how clientele effects and agency issues may affect a company's payout policy.

**Clientele effect.** This refers to the varying dividend preferences of different groups of investors, such as individuals, institutions, and corporations. The dividend clientele effect states that different groups desire different levels of dividends. Rationales for the existence of the clientele effect include:

- *Tax considerations.* High-tax-bracket investors (like some individuals) tend to prefer low dividend payouts, while low-tax-bracket investors (like corporations and pension funds) may prefer high dividend payouts.

In the presence of differential tax rates on dividends ( $T_D$ ) and capital gains ( $T_{CG}$ ), investors would be indifferent between receiving:  $\$D$  in dividends or

$$\$D (1 - T_D) / (1 - T_{CG}) \text{ in capital gains.}$$

In other words, when the stock goes ex-dividend:

$$\Delta P = \frac{D(1 - T_D)}{(1 - T_{CG})}$$

where:

$\Delta P$  = change in price when the stock goes from with dividend to ex-dividend



**Example: Dividend versus capital gains**

1. Consider a firm is planning on declaring €12 in dividends. The tax rates for a marginal investor are:  $T_{CG} = 15\%$  and  $T_D = 30\%$ . Compute the expected drop in share price when the stock goes ex-dividend.
2. Suppose the tax rate on capital gains  $T_{CG} = 25\%$ . If the stock price of a company falls by 85% of the dividend amount on average when the stock goes ex-dividend, what is the tax rate on dividend for a marginal investor in that stock?

**Answer:**

1. Expected drop in stock price =  $12 \times (1 - 0.30) / (1 - 0.15) = €9.88$ . In other words, investors would be indifferent between €12 in dividends and €9.88 in capital gains. Note that since the tax rate on dividend is higher, investors would prefer capital gains as compared to dividends. Hence, a \$1 of dividend is worth less than a \$1 of capital gains.
2.  $\Delta P = D(1 - T_D) / (1 - T_{CG})$   
 Or  $0.85 = 1(1 - T_D) / (1 - 0.25)$   
 $T_D = 0.3625$

- *Requirements of institutional investors.* For legal or strategic reasons, some institutional investors will invest only in companies that pay a dividend or have a dividend yield above some target threshold. Examples are dividend-focused mutual funds and some trusts that are required to hold dividend-paying stocks.
- *Individual investor preferences.* Some investors prefer to buy stocks so they can spend the dividends while preserving the principal.

It should be noted that the existence of dividend clienteles does not contradict dividend irrelevance theory. A firm's dividend policy would attract a certain clientele. After that, changes in the policy would have no impact as the firm would be simply swapping one clientele for other.

**Agency Issues**

**Between shareholders and managers:** Agency costs reflect the inefficiencies due to divergence of interests between managers and stockholders. One aspect of agency issue is that managers may have an incentive to overinvest (empire building). This may lead to investment in some negative NPV projects, which reduces stockholder wealth. One way to reduce agency cost is to increase the payout of free cash flow as dividends. Generally, it makes sense for growing firms to retain a larger proportion of their earnings. However, mature firms in cyclical industries do not need to hoard cash. In such cases, higher dividend payout would be welcomed by the investors resulting in increases in stock value.

**Between shareholders and bondholders:** For firms financed by debt as well as equity, there may be an agency conflict between shareholders and bondholders. When there is risky debt outstanding, shareholders can pay themselves a large dividend, leaving the bondholders with a lower asset base as collateral. This way, there could be a transfer

of wealth from bondholders to stockholders. Typically, agency conflict between stockholders and bondholders is resolved via provisions in the bond indenture. These provisions may include restrictions on dividend payment, maintenance of certain balance sheet ratios, and so on.

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### LOS 31.d: Discuss the factors that affect dividend policy.

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A company's dividend payout policy is the approach a company follows in determining the amount and timing of dividend payments to shareholders. Six primary factors affect a company's dividend payout policy:

1. **Investment opportunities.** Availability of positive NPV investment opportunities and the speed with which the firm must react to the opportunities determines the amount of cash the firm must keep on hand. If the firm faces many profitable investment opportunities and has to react quickly to capitalize on the opportunities (it does not have time to raise external capital), dividend payout would be low.
2. **Expected volatility of future earnings.** Firms tie their target payout ratio to long-run sustainable earnings and are reluctant to increase dividends unless reversal is not expected in the near future. Hence, when earnings are volatile, firms are more cautious in *changing* dividend payout.
3. **Financial flexibility.** Firms with excess cash and a desire to maintain financial flexibility may resort to stock repurchases instead of dividends as a way to pay out excess cash. Since stock repurchase plans are not considered sticky (there is no implicit expectation by the market of an ongoing repurchase program), they don't entail reduction in financial flexibility going forward. Having cash on hand affords companies flexibility to meet unforeseen operating needs and investment opportunities. Financial flexibility is especially important during times of crisis when liquidity dries up and credit may be hard to obtain.
4. **Tax considerations.** Investors are concerned about after-tax returns. Investment income is taxed by most countries; however, the ways that dividends are taxed vary widely from country to country. The method and amount of tax applied to a dividend payment can have a significant impact on a firm's dividend policy. Generally, in countries where capital gains are taxed at a favorable rate as compared to dividends, high-tax-bracket investors (like some individuals) prefer low dividend payouts, and low-tax-bracket investors (like corporations and pension funds) prefer high dividend payouts.

A lower tax rate for dividends compared to capital gains does not necessarily mean companies will raise their dividend payouts. Stockholders may not prefer a higher dividend payout, even if the tax rate on dividends is more favorable, for multiple reasons:

- Taxes on dividends are paid when the dividend is received, while capital gains taxes are paid only when shares are sold.
- The cost basis of shares may receive a step-up in valuation at the shareholder's death. This means that taxes on capital gains may not have to be paid at all.
- Tax-exempt institutions, such as pension funds and endowments, will be indifferent between dividends or capital gains.

5. **Flotation costs.** When a company issues new shares of common stock, a *flotation cost* of 3% to 7% is taken from the amount of capital raised to pay for investment bankers and other costs associated with issuing the new stock. Since retained earnings have no such fee, the cost of new equity capital is always higher than the cost of retained earnings. Larger companies typically have lower flotation costs as compared to smaller companies. Generally, the higher the flotation costs, the lower the dividend payout, given the need for equity capital in positive NPV projects.
6. **Contractual and legal restrictions.** Companies may be restricted from paying dividends either by legal requirements or by implicit restrictions caused by cash needs of the business. Common legal and contractual restrictions on dividend payments include:
  - The **impairment of capital rule.** A legal requirement in some countries mandates that dividends paid cannot be in excess of retained earnings.
  - **Debt covenants.** These are designed to protect bondholders and dictate things a company must or must not do. Many covenants require a firm to meet or exceed a certain target for liquidity ratios (e.g., current ratio) and coverage ratios (e.g., interest coverage ratio) before they can pay a dividend.

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**LOS 31.e: Calculate and interpret the effective tax rate on a given currency unit of corporate earnings under double-taxation, split rate, and tax imputation dividend tax regimes.**

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Dividends paid in the United States are taxed according to what is called a **double-taxation system**. Earnings are taxed at the corporate level regardless of whether they are distributed as dividends, and dividends are taxed again at the shareholder level. In 2003, new tax legislation was passed in the United States that reduced the maximum tax rate on dividends at the individual shareholder level from 39.6% to 15%.

Since a dollar of earnings distributed as dividends is the first taxed at the corporate level, with the after-corporate-tax amount taxed at the individual level, we can calculate the total effective tax rate as:

$$\text{effective tax rate} = \text{corporate tax rate} + (1 - \text{corporate tax rate})(\text{individual tax rate})$$

**Example: Effective tax rate under a double taxation system**

A U.S. company's annual earnings are \$300, and the corporate tax rate is 35%. Assume that the company pays out 100% of its earnings as dividends. Calculate the effective tax rate on a dollar of corporate earnings paid out as dividends assuming 15% tax rate on dividend income.

**Answer:**

Earnings	\$300.00
(–) Tax @ 35%	<u>(105.00)</u>
Earnings after tax	195.00
Dividends (100% payout)	195.00
Tax on dividends (@ 15%)	<u>(29.25)</u>
After tax dividend to investor	165.75

Effective (double) tax rate =  $(300 - 165.75) / 300 = 44.75\%$

or

$0.35 + (1 - 0.35)(0.15) = 0.4475$  or 44.75%.

A **split-rate** corporate tax system taxes earnings distributed as dividends at a lower rate than earnings that are retained. The effect is to offset the higher (double) tax rate applied to dividends at the individual level. Germany has a split-rate system. The calculation of the effective tax rate under a split rate system is similar to computation of the effective tax rate under double taxation except that the corporate tax rate applicable would be the corporate tax rate for distributed income.

**Example: Effective tax rate under a split-rate system**

A German company's annual pretax earnings are €300. The corporate tax rate on retained earnings is 35%, and the corporate tax rate that applies to earnings paid out as dividends is 20%. Assuming that the company pays out 50% of its earnings as dividends, and the individual tax rate that applies to dividends is 30%, calculate the effective tax rate on one euro of corporate earnings paid out as a dividend.

**Answer:**

$$\begin{aligned} \text{effective tax rate on income distributed as dividends} &= 20\% + [(1 - 20\%) \times 30\%] \\ &= 44\% \end{aligned}$$

Note that under a split-rate system, earnings that are distributed as dividends are still taxed twice but at a lower corporate tax rate (corporate rate for distributed income).

Under an **imputation tax system**, taxes are paid at the corporate level but are attributed to the shareholder, so that *all taxes are effectively paid at the shareholder rate*. Shareholders deduct their portion of the taxes paid by the corporation from their tax return. If the shareholder tax bracket is lower than the company rate, the shareholder would receive a tax credit equal to the difference between the two rates. If the shareholder's tax bracket is higher than the company's rate, the shareholder pays the difference between the two rates.

**Example: Effective tax rate under an imputation system**

Phil Cornelius and Ian Todd both own 100 shares of stock in a British corporation that makes £1.00 per share in net income. The corporation pays out all of its income as dividends. Cornelius is in the 20% individual tax bracket, while Todd is in the 40% individual tax bracket. The tax rate applicable to the corporation is 30%. Calculate the effective tax rate on the dividend for each shareholder.

**Answer:**

**Effective Tax Rate Under an Imputation System**

	<i>Cornelius: 20% Rate</i>	<i>Todd: 40% Rate</i>
Pretax income	£100	£100
Taxes at 30% corporate tax rate	<u>£30</u>	<u>£30</u>
Net income after tax	<u>£70</u>	<u>£70</u>
Dividend assuming 100% payout	£70	£70
Shareholder taxes	£20	£40
Less tax credit for corporate payment	<u>£30</u>	<u>£30</u>
Tax due from shareholder	(£10)	£10
Effective tax rate on dividend	20 / 100 = 20%	40 / 100 = 40%

Under an imputation system, the effective tax rate on the dividend is simply the shareholder's marginal tax rate.

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**LOS 31.f: Compare and contrast stable dividend, target payout, and residual dividend payout policies, and calculate the dividend under each policy.**


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**Stable Dividend Policy**

The **stable dividend policy** focuses on a steady dividend payout, even though earnings may be volatile from year to year. Companies that use a stable dividend policy typically look at a forecast of their long-run earnings to determine the appropriate level for the stable dividend. This typically means aligning the company's dividend growth rate with the company's long-term earnings growth rate.

A stable dividend policy could be gradually moving towards a target dividend payout ratio. A model of gradual adjustment is called a **target payout ratio adjustment model**.

*Target Payout Ratio Adjustment Model*

If company earnings are expected to increase and the current payout ratio is below the target payout ratio, an investor can estimate future dividends through the following formula:

$$\text{expected dividend} = \left( \text{previous dividend} \right) + \left[ \left( \frac{\text{expected increase in EPS}}{\text{in EPS}} \right) \times \left( \frac{\text{target payout ratio}}{\text{ratio}} \right) \times \left( \frac{\text{adjustment factor}}{\text{factor}} \right) \right]$$

where:

adjustment factor = 1 / number of years over which the adjustment in dividends will take place

**Example: Expected dividend based on a target payout approach**

Last year, Buckeye, Inc., had earnings of \$3.50 per share and paid a dividend of \$0.70. In the current year, the company expects to earn \$4.50 per share. The company has a 35% target payout ratio and plans to bring its dividend up to the target payout ratio over a 5-year period. Calculate the expected dividend for the current year.

**Answer:**

$$\begin{aligned} \text{expected dividend} &= \$0.70 + [(\$4.50 - \$3.50) \times 0.35 \times (1/5)] \\ &= \$0.70 + [\$1.00 \times 0.35 \times 0.2] \\ &= \$0.70 + 0.07 \\ &= \$0.77 \end{aligned}$$



*Professor's Note: Notice that the payout ratio actually falls from 20% to 17%. This is counterintuitive and seems to contradict the concept of the target payout ratio approach, which says that the firm should always be moving toward its target payout ratio (which in this case is 35%). Level 2 candidates are always troubled by the apparent inconsistency in the target payout ratio approach. However, we can assure you that this example correctly applies the method and answers the LOS correctly. Target payout approach model is expected to work in the long-run, even though year-to-year results may defy the logic behind it.*

**Constant Dividend Payout Ratio Policy**

A payout ratio is the percentage of total earnings paid out as dividends. The constant payout ratio represents the proportion of earnings that a company plans to pay out to shareholders. A strict interpretation of the constant payout ratio method means that a company would pay out a specific percentage of its earnings each year as dividends, and the amount of those dividends would vary directly with earnings. This practice is seldom used.

## Residual Dividend Model

In the **residual dividend model**, dividends are based on earnings less funds the firm retains to finance the equity portion of its capital budget. The model is based on the firm's (1) investment opportunity schedule (IOS), (2) target capital structure, and (3) access to and cost of external capital.

The following steps are followed to determine the target payout ratio (dividends per share / earnings per share):

*Step 1:* Identify the optimal capital budget.

*Step 2:* Determine the amount of equity needed to finance that capital budget for a given capital structure.

*Step 3:* Meet equity requirements to the maximum extent possible with retained earnings.

*Step 4:* Pay dividends with the “residual” earnings that are available after the needs of the optimal capital budget are supported. In other words, the residual policy implies that dividends are paid out of leftover earnings.

For example, let's assume that the Larson Company has \$1,000 in earnings.

Larson has a target debt-to-equity ratio of 0.5. This implies a capital structure of one-third debt and two-thirds equity. (If  $D$  is \$1.00, equity,  $E$ , must be \$2.00 since  $D/E = 0.5 = 1/2$ . This means that assets,  $A$ , are  $\$3.00 = \$1.00 + \$2.00$ , so the capital structure is  $D/A = 1/3$  and  $E/A = 2/3$ ).

If the firm reinvests all of its earnings, its equity will increase by \$1,000. To maintain the target capital structure, the firm must borrow an additional \$500. Thus, the total amount of funds that can be generated without selling new equity is  $\$1,000 + \$500 = \$1,500$ . If planned capital spending is less than the total amount of capital available (e.g., \$900 versus \$1,500) the firm can pay dividends. To maintain the target capital structure, the \$900 capital spending will be financed with  $[(1/3)(\$900)] = \$300$  of debt and  $[(2/3)(\$900)] = \$600$  of equity. The residual amount is  $(\$1,000 - \$600) = \$400$ , so dividends under the residual method would be \$400.

Advantages of the residual dividend model:

- The model is simple to use. The company uses the funds necessary to invest in profitable projects and then gives what is left over to the shareholders.
- The model allows management to pursue profitable investment opportunities without being constrained by dividend considerations.

Disadvantages of the residual dividend model:

- If a firm follows the residual dividend policy, its dividend payments may be unstable. Investment opportunities and earnings often vary from year to year. This means that dividends will fluctuate if a firm strictly adheres to a residual dividend policy.

**Long-term residual dividend.** Some companies try to mitigate the disadvantages of the residual dividend approach by forecasting their capital budget over a longer time frame (e.g., five to ten years). The leftover earnings over this longer time frame are allocated as



dividends and are paid out in relatively equal amounts each year. Any excess cash flows are distributed through share repurchases.

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**LOS 31.g: Discuss the choice between paying cash dividends and repurchasing shares.**

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Now that we have discussed various dividend policy approaches, it is important to point out that a share repurchase program can be an important part of a company's *payout* policy. A **share repurchase** is a transaction in which a company buys back shares of its own common stock. Since shares are bought using a company's own cash, a share repurchase can be considered an alternative to a cash dividend.

There are five common rationales for share repurchases (versus dividends):

1. **Potential tax advantages.** When tax rate on capital gains are lower than the tax rate on dividend income, share repurchases have a tax advantage over cash dividends.
2. **Share price support/signaling.** Companies may purchase their own stock, thereby signaling to the market that the company views its own stock as a good investment. Signaling is important in the presence of asymmetric information (where corporate insiders have access to better information about the company's prospects than outside investors). Management can send a signal to investors that the future outlook for the company is good. This tactic is often used when a share price is declining and management wants to convey confidence in the company's future to investors.
3. **Added flexibility.** A company could declare a regular cash dividend and periodically repurchase shares as a supplement to the dividend. Unlike dividends, share repurchases are not a long-term commitment. Since paying a cash dividend and repurchasing shares are economically equivalent, a company could declare a small stable dividend and then repurchase shares with the company's leftover earnings to effectively implement a residual dividend policy without the negative impact that fluctuating cash dividends may have on the share price. Additionally, managers have discretion with respect to "market timing" their repurchases.
4. **Offsetting dilution from employee stock options.** Repurchases offset EPS dilution that results from the exercise of employee stock options.
5. **Increasing financial leverage.** Share repurchases increase leverage. Management can change the company's capital structure (and perhaps move toward the company's optimal capital structure) by decreasing the percentage of equity.



**Example: Impact of share repurchase and cash dividend of equal amounts**

Spencer Pharmaceuticals, Inc. (SPI) has 20,000,000 shares outstanding with a current market value of \$50 per share. SPI made \$100 million in profits for the recent quarter, and since only 70% of these profits will be reinvested back into the company, SPI's Board of Directors is considering two alternatives for distributing the remaining 30% to shareholders:

- Pay a cash dividend of  $\$30,000,000 / 20,000,000 \text{ shares} = \$1.50$  per share.
- Repurchase \$30,000,000 worth of common stock.

Assume that dividends are received when the shares go ex-dividend, the stock can be repurchased at the market price of \$50 per share, and there are no differences in tax treatment between the two alternatives. How would the wealth of an SPI shareholder be affected by the board's decision on the method of distribution?

**Answer:**

**(1) Cash dividend**

After the shares go ex-dividend, a shareholder of a single share would have \$1.50 in cash and a share worth  $\$50 - \$1.50 = \$48.50$ .

The ex-dividend value of \$48.50 can also be calculated as the market value of equity after the distribution of the \$30 million, divided by the number of shares outstanding after the dividend payment.

$$\frac{(20,000,000)(\$50) - \$30,000,000}{20,000,000} = \$48.50$$

Total wealth from the ownership of one share =  $\$48.50 + \$1.50 = \$50$ .

**(2) Share repurchase**

With \$30,000,000, SPI could repurchase  $\$30,000,000 / \$50 = 600,000$  shares of common stock. The share price after the repurchase is calculated as the market value of equity after the \$30,000,000 repurchase divided by the shares outstanding after the repurchase:

$$\frac{(20,000,000)(\$50) - \$30,000,000}{20,000,000 - 600,000} = \frac{\$970,000,000}{19,400,000} = \$50$$

Total wealth from the ownership of one share = \$50.

Assuming the tax treatment of the two alternatives is the same, a share repurchase has the same impact on shareholder wealth as a cash dividend payment of an equal amount.

In the previous example, we assumed that the company used cash to repurchase its stock. What if the company borrows funds to buy back the stock?

**Example: Share repurchase when the after-tax cost of debt is less than the earnings yield**

Spencer Pharmaceuticals, Inc. (SPI) plans to borrow \$30 million that it will use to repurchase shares. SPI's chief financial officer has compiled the following information:

- Share price at the time of buyback = \$50.
- Shares outstanding before buyback = 20,000,000.
- EPS before buyback = \$5.00.
- Earnings yield = \$5.00 / \$50 = 10%.
- After-tax cost of borrowing = 8%.
- Planned buyback = 600,000 shares.

Calculate the EPS after the buyback.

**Answer:**

$$\text{total earnings} = \$5.00 \times 20,000,000 = \$100,000,000$$

$$\begin{aligned} \text{EPS after buyback} &= \frac{\text{total earnings} - \text{after-tax cost of funds}}{\text{shares outstanding after buyback}} \\ &= \frac{\$100,000,000 - (600,000 \text{ shares} \times \$50 \times 0.08)}{(20,000,000 - 600,000) \text{ shares}} \\ &= \frac{\$100,000,000 - \$2,400,000}{19,400,000 \text{ shares}} \\ &= \frac{\$97,600,000}{19,400,000 \text{ shares}} \\ &= \$5.03 \end{aligned}$$

Since the after-tax cost of borrowing of 8% is less than the 10% earnings yield (E/P) of the shares, the share repurchase will increase the company's EPS.

**Example: Share repurchase with borrowed funds where after-tax cost of debt exceeds the earnings yield**

Spencer Pharmaceuticals, Inc. (SPI) plans to borrow \$30 million that it will use to repurchase shares; however, creditors perceive the company to be a significant credit risk, and the after-tax cost of borrowing has jumped to 15%. Using the other information from the previous example, calculate the EPS after the buyback.

**Answer:**

$$\begin{aligned}
 \text{EPS after buyback} &= \frac{\text{total earnings} - \text{after-tax cost of funds}}{\text{shares outstanding after buyback}} \\
 &= \frac{\$100,000,000 - (600,000 \text{ shares} \times \$50 \times 0.15)}{(20,000,000 - 600,000) \text{ shares}} \\
 &= \frac{\$100,000,000 - \$4,500,000}{19,400,000 \text{ shares}} \\
 &= \frac{\$95,500,000}{19,400,000 \text{ shares}} \\
 &= \$4.92
 \end{aligned}$$

Because the after-tax cost of borrowing of 15% exceeds the earnings yield of 10%, the added interest paid reduces earnings, and the EPS after the buyback is less than the original \$5.00.

The conclusion is that a share repurchase using borrowed funds will increase EPS if the after-tax cost of debt used to buy back shares is less than the earnings yield of the shares before the repurchase. It will decrease EPS if the cost of debt is greater than the earnings yield, and it will not change EPS if the two are equal.

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### LOS 31.h: Discuss global trends in corporate dividend policies.

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Dividend policy has been seen to have differences across countries and over time. This is probably to accommodate differences in investor preferences globally as well as changing investor preferences over time. The following generalizations can be made with respect to global trends in corporate dividend policies:

1. A lower proportion of U.S. companies pay dividends as compared to their European counterparts.
2. Globally, in developed markets, the proportion of companies paying cash dividends has trended downwards over the long term.
3. The percentage of companies making stock repurchases has been trending upwards in the United States since the 1980s and in the United Kingdom and continental Europe since the 1990s.

**LOS 31.i: Calculate and interpret dividend coverage ratios based on 1) net income and 2) free cash flow.**

**LOS 31.j: Discuss the symptoms of companies that may not be able to sustain their cash dividend.**

**Dividend safety** is the metric used to evaluate the probability of dividends continuing at the current rate for a company. Traditional ratios, such as **dividend payout ratio** (dividends/net income) or its inverse **dividend coverage ratio** (net income/dividends), are typically used for this purpose. A higher than normal dividend payout ratio (and lower than normal dividend coverage ratio) tends to typically indicate a higher probability of a dividend cut (or a lower probability of dividend sustainability).

In analyzing these ratios, we should compare the computed ratio to the average ratio for the industry and market within which a company operates. In making a qualitative judgment about a company, stable or increasing dividends are looked upon favorably, whereas companies that have cut their dividends in the past are looked upon unfavorably.

Another ratio considers free cash flow to equity (FCFE). FCFE is the cash flow available for distribution to stockholders after working capital and fixed capital needs are accounted for.



*Professor's Note: FCFE is discussed extensively in equity valuation.*

$$\text{FCFE coverage ratio} = \text{FCFE} / (\text{dividends} + \text{share repurchases})$$

Note that unlike dividend payout ratio, the FCFE coverage ratio considers not only dividends but also share repurchases.

A FCFE coverage ratio significantly less than one is considered unsustainable. In such a case, the company is drawing down its cash reserves for dividends/repurchases.

**Example: Dividend sustainability analysis**

Chevron Corp. (NYSE: CVX) is a San Ramon, CA based global integrated energy company. Selected financial data for years ending December 31, 2008 and 2009 is provided below:

<i>Year Ending 31 December (US \$ Millions)</i>	<i>2009</i>	<i>2008</i>
Net income	\$10,483	\$23,931
Cash flow from operations	\$19,373	\$29,632
Capital Expenditures (FcInv)	\$19,843	\$19,666
Net borrowing	\$1,659	\$1,682
Dividends paid	\$5,373	\$5,261
Stock repurchases	\$(168)	\$6,821

Source: Yahoo! Finance Web site. July 27, 2010

1. Using the information provided, calculate:
  - a. Dividend payout ratio
  - b. Dividend coverage ratio
  - c. FCFE coverage ratio
2. Discuss the trend in dividend coverage ratio and compare it to FCFE coverage ratio
3. Is Chevron's dividend sustainable?

**Answer:**

1. a. Dividend payout ratio = dividend / net income.  
 2008:  $5,261 / 23,931 = 0.22$  or 22%  
 2009:  $5,373 / 10,483 = 0.51$  or 51%
- b. Dividend coverage ratio = net income / dividend  
 2008:  $23,931 / 5,261 = 4.55$   
 2009:  $10,483 / 5,373 = 1.95$

c.  $FCFE = \text{cash flow from operations} - \text{FcInv} + \text{net borrowings}$

$$2008: FCFE = 29,632 - 19,666 + 1,682 = 11,648$$

$$2009: FCFE = 19,373 - 19,843 + 1,659 = 1,189$$

$$FCFE \text{ coverage ratio} = FCFE / (\text{dividends} + \text{share repurchases})$$

FCFE coverage ratio:

$$2008: 11,648 / (5,261 + 6,821) = 0.96$$

$$2009: 1,189 / [5,373 + (-168)] = 0.23$$

2. The dividend coverage ratio has decreased considerably from 4.55 in 2008 to 1.95 in 2009. FCFE coverage ratio has also decreased significantly from 0.96 to 0.23. It appears that Chevron's dividend sustainability is lower in 2009 as compared to 2008.
3. Chevron's dividend coverage has decreased significantly from 2008 to 2009. Still, even with this decrease, Chevron's dividend coverage is almost 2 times. Chevron's FCFE coverage ratio has also decreased dramatically from 2008 to 2009. This is despite the fact that the company stopped its share repurchase plan in 2009 (in fact it issued additional stock—most likely to provide shares for exercise of employee stock options). Additionally, even if we consider 2009 to be a bad year due to a downturn in oil prices, the 2008 ratio is still below one. FCFE coverage ratio analysis therefore suggests that Chevron's payout policy is unsustainable for the long run.

## KEY CONCEPTS

### LOS 31.a

Following are the three theories of investor preference:

- MM's dividend irrelevance theory holds that in a no-tax/no-fees world, dividend policy is irrelevant since it has no effect on the price of a firm's stock or its cost of capital, because individual investors can create their own homemade dividend.
- Dividend preference theory says investors prefer the certainty of current cash to future capital gains.
- Tax aversion theory states that investors are tax averse to dividends and would prefer companies instead buy back shares, especially when the tax rate on dividends is higher than the tax rate on capital gains.

### LOS 31.b

The signaling effect of dividend changes is based on the idea that dividends convey information about future earnings from management to investors (who have less information about a firm's prospects than management). In general, unexpected increases are good news and unexpected decreases are bad news as seen by U.S. investors.

### LOS 31.c

Clientele effect refers to the varying preferences for dividends of different groups of investors, such as individuals, institutions, and corporations. Companies structure their dividend policies consistent with preferences of their clienteles. Miller and Modigliani, however, note that once all the clienteles are satisfied, changing the dividend policy would only entail changing clienteles and would not affect firm value.

Two types of agency issues affect dividend payout policies:

- Agency conflict between shareholders and managers can be reduced by paying out a higher proportion of the firm's free cash flow to equity so as to discourage investment in negative NPV projects.
- Agency conflict between shareholders and bondholders occurs when shareholders can expropriate bondholder wealth by paying themselves a large dividend (and leaving a lower asset base for outstanding bonds as collateral). Agency conflict between bondholders and stockholders is typically resolved via provisions in bond indenture.

### LOS 31.d

Six primary factors affect a company's dividend payout policy:

1. Investment opportunities: affects the residual income available to pay as dividends.
2. Expected volatility of future earnings: firms are more cautious in changing dividend payout in the presence of high earnings volatility.
3. Financial flexibility: Firms may not increase dividends (even in presence of significant free cash flow) so as not to be forced to continue paying those dividends in the future and losing financial flexibility. Instead, firms can choose to pay out excess cash via stock repurchases.

4. Tax considerations: In the presence of differential tax rate on capital gains versus dividends, companies may structure their dividend policy to maximize investors' after-tax income.
5. Flotation costs: Flotation cost increases the cost of external equity as compared to retained earnings. Hence, higher flotation cost would motivate firms to have a lower dividend payout.
6. Contractual and legal restrictions: Dividend policy may be affected by debt covenants that the firm has to adhere to. Legal restrictions in some jurisdictions limit the dividend payout of a firm.

### LOS 31.e

Effective rate under double taxation = corporate tax rate +  
 $(1 - \text{corporate tax rate}) \times (\text{individual tax rate})$

A split-rate system has different corporate tax rates on retained earnings and earnings that are paid out in dividends (distributed income). Under split-rate system, effective tax rate is computed the same way as double taxation but we use the corporate tax rate for distributed income as the relevant corporate tax rate in the double taxation formula.

Under a tax imputation system, taxes are paid at the corporate level but are used as credits by the stockholders. Hence, all taxes are effectively paid at the shareholder's marginal tax rate.

### LOS 31.f

Stable dividend policy: A company tries to align its dividend growth rate with the company's long-term earnings growth rate to provide a steady dividend. A firm with a stable dividend policy could use a target payout adjustment model to gradually move towards its target payout.

$$\text{expected dividend} = \left( \text{previous dividend} \right) + \left[ \left( \frac{\text{expected increase in EPS}}{\text{target payout ratio}} \right) \times \left( \frac{\text{adjustment factor}}{\text{ratio}} \right) \right]$$

where:

adjustment factor =  $1 / \text{number of years over which the adjustment in dividends will take place}$

Constant payout ratio: Company defines a proportion of earnings that it plans to pay out to shareholders regardless of volatility in earnings (and consequently in dividends).

Residual dividend approach: Dividends are based on earnings less funds the firm retains to finance the equity portion of its capital budget.

Advantages: (1) easy for the company to use; (2) maximizes allocation of earnings to investment.

Disadvantages: (1) dividend fluctuates with investment opportunities and earnings; (2) uncertainty causes higher required return and lower valuation.

Longer-term residual dividend: Company forecasts its capital budget over a longer time frame and attempts to pay out the residual in steady dividend payments.



**LOS 31.g**

There are five common rationales for share repurchases (versus dividends):

1. Potential tax advantages: When capital gains are taxed favorably as compared to dividends.
2. Share price support/signaling: Management wants to signal better prospects for the firm.
3. Added flexibility: Reduces the need for “sticky” dividends in the future.
4. Offsets dilution from employee stock options.
5. Increases financial leverage by reducing equity in the balance sheet.

**LOS 31.h**

Global trends in corporate dividend policies:

1. A lower proportion of U.S. companies pay dividends as compared to their European counterparts.
2. Globally, the proportion of companies paying cash dividends has trended downwards.
3. Stock repurchases have been trending upwards in the United States since the 1980s and in the United Kingdom and continental Europe since the 1990s.

**LOS 31.i**

Dividend coverage ratio = net income / dividends

FCFE coverage ratio = FCFE / (dividends + share repurchases)

**LOS 31.j**

For both dividend and FCFE coverage, ratios that are below industry averages or trending downwards over time indicate problems for dividend sustainability.

## CONCEPT CHECKERS

1. In a country where capital gains are taxed favorably compared to dividends, when a share goes ex-dividend, the share's price is most likely to drop by:
  - A. less than the amount of the dividend.
  - B. more than the amount of the dividend.
  - C. the same amount as the dividend.
2. Over the past 25 years, in the developed markets including the United States, the United Kingdom, and the European Union, the fraction of companies that:
  - A. pay out cash dividends has increased.
  - B. repurchase shares has increased.
  - C. use particular dividend policies has been consistent over time and across countries.
3. Which of the following is *most likely* to be sustainable?
  - A. A FCFE coverage ratio of 0.5.
  - B. A dividend payout ratio of 0.5.
  - C. A dividend coverage ratio of 0.5.

Use the following information to answer Questions 4 through 6.

Klaatu is a country that taxes dividends based on a double-taxation system. The corporate tax rate on company profits is 35%. Barada is a country that taxes dividends based on a split-rate tax system. The corporate tax rate applied to retained earnings is 36%, while the corporate tax rate applied to earnings paid out as dividends is 20%. Nikto is a country that taxes dividends based on an imputation tax system. The corporate tax rate on earnings is 38%.

4. An investor living in Klaatu holds 100 shares of stock in the Lucas Corporation. Lucas's pretax earnings for the current year are \$2.00 per share, and the company has a payout ratio of 100%. The investor's individual tax rate on dividends is 30%. The effective tax rate on a dollar of funds to be paid out as dividends is *closest* to:
  - A. 35.0%.
  - B. 54.5%.
  - C. 62.3%.
5. An investor living in Barada holds 100 shares of Prowse, Inc. Prowse's pretax earnings in the current year are \$1.00 per share, and Prowse pays dividends based on a target payout ratio of 40%. The individual tax rate that applies to dividends is 28%, and the individual tax rate that applies to capital gains is 15%. The effective tax rate on earnings distributed as dividends is:
  - A. 20.0%.
  - B. 42.4%.
  - C. 53.9%.

6. Jenni White and Janet Langhals are each shareholders that live in Nikto, and each owns 100 shares of OCP, Inc., which has €1.00 per share in net income. OCP pays out 100% of its earnings as dividends. White is in the 25% tax bracket, while Langhals is in the 42% tax bracket. The effective tax rate on earnings paid out as dividends is:
- 28.0% for White and 42.0% for Langhals.
  - 53.5% for White and 64.0% for Langhals.
  - 25.0% for White and 42.0% for Langhals.
7. Nick Adams is recommending to the board of directors that they share the profits from an excellent year (totaling \$56 million) with shareholders by either declaring a special cash dividend of \$20 million, or using the \$20 million to repurchase shares of Volksberger common stock in the open market. Selected financial information about the firm is shown below.
- |                              |                    |
|------------------------------|--------------------|
| Shares outstanding:          | 40 million         |
| Current stock price:         | \$28.00            |
| 52-week trading range:       | \$20.00 to \$36.00 |
| Book value of equity:        | \$880 million      |
| After-tax cost of borrowing: | 5.5%               |
- Adams drafts a memo to the board of directors detailing the financial impact of declaring a special cash dividend versus repurchasing shares. His memo includes the following two statements:
- The total shareholder wealth resulting from owning one share of stock with the special dividend option will increase to \$28.50.
  - Our company's P/E ratio after the share buyback will remain the same as before the buyback.
- Which of Adams's statements are correct?
- Both statements are correct.
  - Only one of the statements is correct.
  - Neither statement is correct.
8. Which of the following would not be a good reason for a company to repurchase shares of its own stock? Management:
- believes a stable cash dividend is in the best interests of shareholders.
  - believes its stock is overvalued.
  - wants to increase the amount of leverage in its capital structure.
9. Which of the following factors would encourage a company to maintain a high dividend payout ratio?
- The double-taxation system is in place in the company's home country.
  - Most of the shares in the company are held by income-oriented mutual funds.
  - The company's debt covenants require an interest coverage ratio of at least 2.0x.

10. Firms that use a residual dividend model are *least likely* to:
  - A. determine their optimal capital budgets.
  - B. issue common stock to maintain the dividend payout schedule.
  - C. determine the amount of equity needed to meet the capital budget.
11. If a firm follows a residual dividend policy and has an optimal capital budget that will require the use of all this year's earnings, the firm would *most likely* pay:
  - A. no dividends to common stockholders.
  - B. dividends financed by borrowing the money.
  - C. dividends but only out of past retained earnings.
12. The bird-in-hand argument for dividend policy is based on the idea that:
  - A.  $r_s = D_1 / P_0 + g$  is constant for any dividend policy.
  - B. a decrease in current dividends signals that future earnings will fall.
  - C. because of perceived differences in risk, investors value a dollar of dividends more highly than a dollar of expected capital gains.
13. An analyst gathered the following information about a company's investment plan:
  - Capital budget of \$5,000.
  - Target capital structure is 70% debt and 30% equity.
  - Net income is \$4,500.

If the company follows a residual dividend policy, the portion of its net income it will pay out as dividends this year is *closest* to:

- A. 50%.
- B. 60%.
- C. 67%.

14. An analyst gathered the following information about a company's investment budget:
  - Expected net income of \$800,000 during the next year.
  - Target and current capital structure is 40% debt and 60% common equity.
  - Optimal capital budget for next year is \$1.2 million.

If the company uses the residual dividend model to determine next year's dividend payout, the company payout is *closest* to:

- A. \$0.
- B. \$80,000.
- C. \$720,000.

15. Last year, Wolverine Shoes and Boots had earnings of \$4.00 per share and paid a dividend of \$0.20. In the current year, the company expects to earn \$4.40 per share. The company has a 30% target payout ratio and plans to bring its dividend up to the target payout ratio over an 8-year period. Next year's expected dividend is *closest* to:
  - A. \$0.212.
  - B. \$0.215.
  - C. \$0.235.

## CHALLENGE PROBLEMS

16. A company has provided the following financial data:
- Target capital structure is 50% debt and 50% equity.
  - After-tax cost of debt is 8%.
  - Cost of retained earnings is estimated to be 13.5%.
  - Cost of equity is estimated to be 14.5% if the company issues new common stock.
  - Net income is \$2,500.

The company is considering the following investment projects:

<u>Project</u>	<u>Size of project</u>	<u>IRR of project</u>
Project A	\$1,000	12.0%
Project B	\$1,200	11.5%
Project C	\$1,200	11.0%
Project D	\$1,200	10.5%
Project E	\$1,000	10.0%

If the company follows a residual dividend policy, its payout ratio will be *closest* to:

- A. 32%.
- B. 54%.
- C. 66%.

## ANSWERS – CONCEPT CHECKERS

1. **A** If most investors' marginal tax rates on capital gains are lower than their marginal tax rates on dividends, the share's price is most likely to drop by *less* than the amount of the dividend when the share goes ex-dividend. The amount of the price decrease is described by the equation  $D \times (1 - T_D) / (1 - T_{CG})$ . If  $T_D$  is greater than  $T_{CG}$ , then the price decrease should be less than  $D$ .
2. **B** Over the past decades, it has been observed that the percentage of companies engaging in share repurchases has increased over time. At the same time, the fraction of companies paying cash dividends has decreased. In addition to changing over time, dividend policies have been noted to differ between countries.
3. **B** An FCFE coverage ratio or dividend coverage ratio much less than one is not sustainable because the company is drawing on cash and marketable securities to make payments. A dividend payout ratio less than one indicates that the company is paying out less in dividends than it is earning, which is the normal (and desirable) situation.
4. **B** The effective tax rate on earnings distributed as dividends is  $0.35 + (1 - 0.35)(0.30) = 0.545 = 54.5\%$ .
5. **B** The effective tax rate on earnings distributed as dividends is  $0.20 + (1 - 0.20)(0.28) = 0.424 = 42.4\%$ .
6. **C** Under an imputation tax system, the effective tax rate on earnings distributed as dividends is the tax rate of the shareholder receiving the dividends.
7. **C** Adams is incorrect with respect to Statement 1. If the firm pays its special dividend of \$20 million, both the assets and equity of the firm will drop by \$20 million. The total wealth from owning one share will be  $[(40 \text{ million})(\$28) - \$20 \text{ million}] / 40 \text{ million} = \$27.50$ , plus  $\$20 \text{ million} / 40 \text{ million} = \$0.50$  per share as a dividend, so the total shareholder wealth resulting from owning one share of stock is \$28. Note that the total shareholder wealth of \$28 is the same whether the cash dividend or share repurchase option is chosen. Adams is also incorrect with respect to Statement 2. The current EPS is  $\$56 \text{ million} / 40 \text{ million} = \$1.40$ , so the current P/E ratio is  $\$28 / \$1.40 = 20$  times earnings. The price per share will remain the same. Share buyback =  $\$20 \text{ million} / 28 = 714,286$  shares. New price =  $[(40 \text{ million} \times \$28/\text{share}) - \$20 \text{ million}] / (40 \text{ million} - 714,286) = \$28/\text{share}$ . EPS will increase.  $\$56 \text{ million} / 39,285,714 = \$1.43$ . Since the price is the same, and EPS increases, the P/E ratio will fall slightly after the repurchase.
8. **B** Management would repurchase shares of its own stock if it believed the shares were undervalued, not overvalued.
9. **B** Institutional investors such as income-oriented mutual funds would invest in companies that pay a high dividend. The clientele effect suggests a company should maintain its current dividend payout policy. A company in the early stage of its life cycle typically does not pay a dividend. Double taxation of dividends and debt covenants both encourage low dividend payout ratios.
10. **B** Under the residual dividend model, the firm pays dividends only if earnings are available to support the optimal capital budget. The firm would not take on additional equity to pay dividends.

11. A If all earnings are used under a residual dividend policy, the firm would not pay any dividends.
12. C The bird-in-hand argument for dividend policy is based on the fact that a dividend payment is more certain than future capital gains.
13. C 30% of \$5,000 or \$1,500 is equity.  $\$4,500 - \$1,500$  is \$3,000, which as a percent is  $\$3,000 / \$4,500 = 67\%$ .
14. B 60% of \$1,200,000 is \$720,000.  $\$800,000 - \$720,000$  is \$80,000.
15. B The expected dividend is computed as  $\$0.20 + [\$0.40 \times 0.30 \times (1/8)] = \$0.20 + \$0.015 = \$0.215$ .

## ANSWERS – CHALLENGE PROBLEMS

16. A First determine the WACC.  $WACC = w_d \times r_d(1 - t) + w_e \times r_s$ , where  $r_s$  is the required return on retained earnings.  $WACC = (0.5)(8) + (0.5)(13.5) = 10.75$ . Second, decide to accept projects A, B, and C since they all have an IRR greater than WACC. This results in a total capital budget of  $\$1,000 + \$1,200 + \$1,200 = \$3,400$ . The equity portion is  $(0.5)(\$3,400) = \$1,700$ . Net income =  $\$2,500 - \$1,700$  is the amount used for the capital budget. \$800 remains.  $\$800 / \$2,500 = 0.32 = 32\%$ .

# CORPORATE GOVERNANCE

Study Session 9

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## EXAM FOCUS

You should know the potential conflicts of interest that create the need for corporate governance as well as the responsibilities of a corporate board of directors. Be prepared for an exam question that asks you to assess whether or not a particular practice is indicative of sound corporate governance. This is a topic that could easily relate to other areas in the Level 2 curriculum, such as ethics and financial statement analysis, so be prepared for corporate governance material to show up anywhere on the exam.

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## WARM-UP: CONFLICTS OF INTEREST IN A CORPORATION

A public corporation typically has multiple owners who often play little or no role in business decisions. Instead, decisions are delegated to professional managers who determine how assets are used and how the business is run. This separation between business owners and management creates the potential for conflicts where management may put their own interests ahead of those of shareholders. Other potential conflicts of interest in a corporation may involve directors, creditors, and other stakeholders, such as employees and customers. The goal of corporate governance is to minimize these conflicts of interest through the application of practical measures and policies.

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**LOS 32.a: Explain corporate governance, discuss the objectives and the core attributes of an effective corporate governance system, and evaluate whether a company's corporate governance has those attributes.**

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McEnally and Kim<sup>1</sup> define **corporate governance** as “the system of principles, policies, procedures, and clearly defined responsibilities and accountabilities used by stakeholders to overcome conflicts of interest inherent in the corporate form.” A company that does not have a sound system of corporate governance in place is taking on a major risk. Recent examples, such as Enron (bankruptcy filing in 2001) and Adelphia (bankruptcy filing in 2002), show that the lack of an effective corporate governance system can threaten a company's very existence. Recently enacted laws and regulations, such as Sarbanes-Oxley in the United States, reflect the fact that a strong system of corporate governance is essential for companies and financial markets to operate efficiently.

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1. Rebecca Todd McEnally and Kenneth Kim, “Corporate Governance,” *CFA® Program Readings*, (Boston, Pearson, 2007), p. 5–51.



Corporate governance has two major objectives:

1. *Eliminate or reduce conflicts of interest.* Although many conflicts of interest exist in a corporation, most corporate governance systems focus on the conflict between management and shareholders.
2. *Use the company's assets in a manner consistent with the best interests of investors and other stakeholders.*

Corporate governance systems will differ according to the legal environment, culture, and industry in which a firm operates; however, there are core attributes that all effective corporate governance systems share. An effective corporate governance system will:

- Define the rights of shareholders and other important stakeholders.
- Define and communicate to stakeholders the oversight responsibilities of managers and directors.
- Provide for fair and equitable treatment in all dealings between managers, directors, and shareholders.
- Have complete transparency and accuracy in disclosures regarding operations, performance, risk, and financial position.

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### LOS 32.b: Compare and contrast the major business forms and describe the conflicts of interest associated with each.

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**Sole proprietorships** are businesses owned and operated by a single individual. Setting up a sole proprietorship is relatively easy and has few legal requirements, thus making it the most common form of business found in the world. Such businesses are usually small-scale operations; examples include hairdressers, restaurants, and dry cleaners. From a legal standpoint, there is no distinction between the business and its owner, resulting in liability for the owner that is potentially unlimited.

*Conflict of interest concerns.* Since the owner and manager of a sole proprietorship is the same person, conflicts between management and owners do not exist. Conflicts of interest for a sole proprietorship typically involve creditors and suppliers.

**Partnerships** are composed of two or more owners/managers, but are otherwise similar to a sole proprietorship in that there is no legal distinction between the business and its owners. Liability is unlimited, but is shared among the partners. The primary advantage of a partnership structure is that partners can pool knowledge and capital, as well as share in business risks. Law firms, real estate firms, and advertising agencies are often organized as partnerships.

*Conflict of interest concerns.* The conflicts for partnerships are similar to those of sole proprietorships, involving creditors and suppliers. Potential conflicts between partners are typically addressed by creating partnership contracts that delineate the roles and responsibilities of each partner.

**Corporations** are distinct legal entities that have rights similar to those of an individual person. The top managers of a corporation are empowered to act as agents of the company and control all corporate activities, including signing contracts, on behalf of

the business. In the United States, corporations represent less than 20% of all businesses, but generate over 90% of business revenues.<sup>2</sup>

Compared to sole proprietorships or partnerships, corporations have several advantages:

- It is much easier to raise large amounts of capital. A corporation can raise capital by issuing common stock to the public, selling ownership interests to private investors in exchange for cash, or borrowing money from creditors.
- There is no need for owners to be industry experts. Any individual with sufficient capital can become a shareholder.
- Ownership stakes are easily transferable, which allows a corporation to have an unlimited life.
- Corporate shareholders have limited liability. Since there is a legal distinction between a corporation and its shareholders, the most a shareholder can lose is the amount invested, nothing more.

*Conflict of interest concerns.* Corporate shareholders typically have no input in day-to-day management of the firm and usually have difficulty monitoring a firm's operations and the actions of management. Separation of ownership and control creates the potential for conflicts between management and shareholders.



*Professor's Note: Corporate governance is designed to address the conflicts of interest that occur in a corporation. The primary conflicts of interest and how they are addressed are covered in the next LOS.*

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### LOS 32.c: Discuss the conflicts that arise in agency relationships, including manager–shareholder conflicts and director–shareholder conflicts.

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An **agency relationship** occurs when an individual, who is referred to as the *agent*, acts on behalf of another individual, who is referred to as the *principal*. Such a relationship creates the potential for a **principal-agent problem** where the agent may act for his own well being rather than that of the principal. Corporate governance systems are primarily concerned with potential principal-agent problems in two areas: (1) between managers and shareholders, and (2) between directors and shareholders.

**Managers and shareholders.** The managers (the agents) make the day-to-day business decisions on behalf of the shareholders (the principals). Therefore, managers are effectively trustees of the capital belonging to the shareholders who, in turn, rely on management to use the funds efficiently to generate profits. Shareholders want management to make decisions that maximize shareholder wealth, but managers, left on their own, may well make decisions that maximize their own wealth. Examples of ways that management may act for their own interests rather than those of shareholders include:

- *Using funds to expand the size of the firm.* A larger firm may increase the managers' job security, power, and compensation without benefiting the shareholders.
- *Granting excessive compensation and perquisites.* Managers may give themselves high salaries and perquisites, such as corporate jets and lavish apartments that are expensed as normal business expenses, forcing shareholders to bear the costs.

2. William J. Megginson, *Corporate Finance Theory* (Reading MA: Addison Wesley, 1997).

- *Investing in risky ventures.* This is one of the key criticisms leveled against the excessive use of executive stock options. By virtue of the nature of their position, managers often stand to reap huge benefits if the risky venture succeeds, but do not share in losses if the venture fails.
- *Not taking enough risk.* Conversely, extremely risk-averse managers who have the bulk of their wealth tied to a firm's stock may only invest in conservative projects to protect that wealth and avoid potentially risky projects that would do a better job of maximizing value for shareholders.

Effective corporate governance systems are designed to monitor management's activities, reward good performance, and discipline managers who do not act in the best interests of shareholders.

**Directors and shareholders.** The purpose of the board of directors of a corporation is to serve as an intermediary between shareholders and management to help ensure that management is acting in the shareholders' best interest. The conflict between directors and shareholders occurs when directors align more with management interests rather than those of shareholders. The following factors may cause directors to align more closely with managers than shareholders:

- *Lack of independence.* Board members that are tied to the company or that may themselves be managers are less likely to identify with shareholder concerns.
- *Board members have personal relationships with management.* Board members may be asked to join the board because of a friendship or family ties with senior management.
- *Board members have consulting or other business agreements with the firm.* Business agreements may give the board member a dual responsibility of answering to management as a consultant while also supervising management as a board member.
- *Interlinked boards.* Senior managers of Firm A may serve as directors in Firm B, while Firm B's senior managers are on the board of Firm A.
- *Directors are overcompensated.* The goal of maintaining their excessive compensation may cause directors to accommodate management wishes rather than protect the best interests of shareholders.

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**LOS 32.d: Describe the responsibilities of the board of directors and explain the qualifications and core competencies that an investment analyst should look for in the board of directors.**

**LOS 32.e: Illustrate effective corporate governance practice as it relates to the board of directors, and evaluate the strengths and weaknesses of a company's corporate governance practice.**

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## The Board of Directors



*Professor's Note: These two LOS have been combined as one. The first LOS asks you to know board attributes, while the second asks you to evaluate if the way a company is addressing the attribute illustrates strong or weak corporate governance. Pay attention to the "best practices" described in the attributes section below—whether or not a company's board is adhering to corporate governance best practices is a likely source of exam questions.*

The board of directors of a corporation is a crucial part of an effective corporate governance system that provides a check and balance between management and shareholders. The board of directors for a corporation has the responsibility to:

- *Institute corporate values* and corporate governance mechanisms that will ensure business is conducted in a proficient, ethical, and fair manner.
- Ensure that the firm meets and *complies with all legal and regulatory requirements* in a timely manner.
- *Create long-term strategic objectives* for the company that are consistent with the shareholders' best interests.
- *Determine management's responsibilities* and how managers will be held accountable. Performance should be measured in all areas of a company's operations.
- Hire, appropriately compensate, and regularly *evaluate the performance of the chief executive officer (CEO)*.
- *Require management to supply the board with complete and accurate information* in order for the board to make decisions for which it is responsible and adequately monitor company management.
- *Meet regularly* to conduct its normal business, and attend extraordinary sessions when necessary.
- *Ensure board members are adequately trained* to perform board functions.

In order to determine the effectiveness of a board of directors, investors or investment analysts must assess:

- *The composition of the board of directors and whether or not directors are independent.* In order to assure that directors are serving shareholders, global best practice recommends that at least three-quarters of board members should be independent.
- *Whether the board has an independent chairman.* Many companies have a single individual serve the dual role of CEO and Chairman of the Board. Some arguments support the dual role as providing the board with in-depth knowledge and experience regarding company strategy and operations. However, others claim that having the CEO chairing board meetings allows the CEO to control the board's agenda and diminishes the role of independent board members, particularly when determining management compensation. For the exam, remember that having the CEO and Chairman as separate positions is considered a strong corporate governance practice.
- *Qualifications of directors.* Directors should bring skills and experience that will assure they will fulfill their fiduciary responsibilities to stakeholders. Corporate governance best practice is for board members to have the requisite industry, strategic planning, and risk management knowledge, not serve on more than two or three boards, and show a commitment to investor interests and ethical management and investing principles.
- *How the board is elected.* All board members may stand for election annually, or staggered elections may take place in which only a portion of the directors are up for election each year. Proponents of staggered elections say that they ensure board continuity. However, strong corporate governance practice says that staggered elections limits the power of shareholders and doesn't allow changes to the board composition to occur quickly. Annual elections force directors to make more careful decisions and be more attentive to shareholders because they can cast a vote to keep or eliminate a director each year.

- *Board self-assessment practices.* Boards should evaluate and assess their effectiveness at least annually. The focus of the self-assessment should be on member participation, committee activities, and future needs of the board.
- *Frequency of separate sessions for independent directors.* Best practice requires independent board members to meet at least annually, preferably quarterly, in separate sessions without management in attendance. Such meetings allow the independent directors to engage in an open discussion about policies, management, and compensation without concerns about management influence.
- *Audit committee and audit oversight.* The audit committee has the responsibility to oversee a company's financial reporting, non-financial corporate disclosure, and internal control systems. The internal audit staff of the firm should report directly to the audit committee. Best practice mandates that the audit committee consists only of independent directors, has expertise in financial and accounting matters, has full access to and the cooperation of management, and meets with auditors at least once annually.
- *Nominating committee.* The nominating committee is responsible for establishing criteria for identifying and evaluating candidates for the board of directors as well as senior management. Corporate governance best practice requires that the nominating committee consists only of independent directors.
- *Compensation committee and the compensation awarded to management.* The directors should use compensation to attract, retain, and motivate talented managers on behalf of shareholders. Compensation should focus on long-term goals and should not be excessive. A common industry practice that is considered poor corporate governance is to use the salary at other companies as a reference point rather than company performance. Another poor practice is the repricing of stock options, which allows management to recoup losses after a stock price decline. Best practice would have base salary and perquisites as a small percentage of compensation, with bonuses, stock options, and grants of restricted stock awarded for exceeding performance goals making up the majority of a senior manager's income.
- *Use of independent or expert legal counsel.* The board of directors should hire expert legal counsel as needed to fulfill its fiduciary duties and assess the company's compliance with regulatory requirements. A common practice is for internal corporate counsel to advise the board of directors, but this is considered weak governance, because of the potential for conflict of interest. Corporate governance best practice is for the board to use independent, outside counsel whenever legal counsel is required.
- *Statement of governance policies.* Statements provided in shareholder materials about corporate governance policies, and how those policies change over time, can be a great tool for analysts and investors in evaluating a firm's corporate governance system.



*Professor's Note: Details regarding the various components of a statement of governance policies are included in the next LOS.*

- *Disclosure and transparency.* The purpose of accounting and disclosure is to fairly and accurately present a company's financial situation. Since investors depend on timely, complete, and accurate financial statements to value securities, providing inaccurate financial data can result in mispriced securities, thus reducing the efficiency of financial markets. In general, best practice supports the conclusion that more disclosure is better. A company should provide information about organization structure, corporate strategy, insider transactions, compensation policies, and changes to governance structures.



*Professor's Note: Financial statement disclosure and quality financial reporting practices are discussed in the Financial Statement Analysis material in Study Session 7.*

- *Insider or related-party transactions.* A recent financial scandal involved a CEO who borrowed millions of company dollars through an employee loan program, and then used his authority as CEO to "forgive" the loan. Best practice for any related-party transaction is to have the transaction approved by the board of directors.
- *Responsiveness to shareholder proxy votes.* Management's response to shareholder proxy matters is a sign of how seriously management takes its fiduciary duties. If an important matter such as executive compensation, a merger, or a governance issue is put to a shareholder vote and management ignores the result of the vote, it is obvious that management is not motivated by shareholder opinion as to what is in the best interest of the shareholders.

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### LOS 32.f: Describe the elements of a company's statement of corporate governance policies that investment analysts should assess.

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Companies that wish to present a commitment to effective corporate governance to the public often supply a statement of corporate governance policies in their regulatory filings or in materials provided to investors. Investors and analysts should assess the following policies of corporate governance:

- *Codes of ethics.* A corporate code of ethics articulates the values, responsibilities, and ethical conduct of an organization.
- *Directors' oversight, monitoring, and review responsibilities.* These include statements regarding internal controls, risk management, audit and accounting disclosure policies, regulatory compliance, nominations, and compensation.
- *Management's responsibility to the board.* These include management's responsibility to provide complete and timely information to board members, and to provide directors with direct access to the company's control and compliance functions.
- *Reports of directors' oversight and review of management.*
- *Board self assessments.*
- *Management performance assessments.*
- *Director training.* Includes training that is provided to directors before they join the board as well as ongoing training.



## LOS 32.g: Discuss the valuation implications of corporate governance.

The strength and effectiveness of a corporate governance system has a direct and significant impact on the value of a company.

*Strong/effective corporate governance system.* U.S. and international companies with effective corporate governance systems have been shown to have higher measures of profitability and generate higher returns for shareholders.

- In a joint study conducted by Institutional Shareholder Services and Georgia State University, the best governed companies generated a return on equity (ROE) that was 23.8% higher than firms with poor corporate governance.<sup>3</sup>
- Portfolios of companies with strong shareholder-rights protections were found to outperform portfolios of companies with weaker protections by 8.5% annually.<sup>4</sup>
- A study of 100 emerging market companies that ranked companies based on seven governance criteria found that companies with the best governance practices generated a cumulative 5-year return 542% greater than firms that had poor governance.<sup>5</sup>

*Weak or ineffective corporate governance system.* The lack of an effective corporate governance system increases the risk to an investor, thus reducing the value of the company. In extreme cases (e.g., Enron, 2001), deficient governance could cause a company to go bankrupt. Risks of an ineffective corporate system include:

- *Financial disclosure risk.* Information and disclosures that investors use as a basis for financial decisions are incomplete, misleading, or materially misstated.
- *Asset risk.* Managers and directors may use company assets inappropriately. Examples include excessive compensation and “perks.”
- *Liability risk.* Management may enter into off-balance-sheet obligations that reduce the value of the shareholders’ stake in the company
- *Strategic policy risk.* Management may enter into transactions that may not be in the best interests of shareholders, but will provide benefits for management. Examples include acquisitions that may increase the size of the firm and improve management’s prestige and perhaps its pay, but ultimately destroy shareholder value.

3. Lawrence D. Brown and Marcus Caylor, “Corporate Governance Study: The Correlation Between Corporate Governance and Company Performance,” (Institutional Shareholder Services, 2004).

4. Paul A. Gompers, Joy L. Ishti, and Andrew Metrick, “Corporate Governance and Equity Prices,” *Quarterly Journal of Economics*, 118, no. 1, (February 2003), p. 107–155.

5. Amar Gill, “Corporate Governance in Emerging Markets – Saints and Sinners: Who’s Got Religion?” *CLSA Emerging Markets*, (April 2001).

## KEY CONCEPTS

### LOS 32.a

McEnally and Kim define corporate governance as “the system of principles, policies, procedures, and clearly defined responsibilities and accountabilities used by stakeholders to overcome conflicts of interest inherent in the corporate form.” The lack of an effective corporate governance system could threaten the existence of a corporation and weaken the trust and confidence that is essential for effective financial markets.

The objectives of corporate governance are to:

- Eliminate or reduce conflicts of interest.
- Use the company’s assets in a manner consistent with the best interests of investors and other stakeholders.

An effective corporate governance system will:

- Define the rights of shareholders and other important stakeholders.
- Define and communicate to stakeholders the oversight responsibilities of managers and directors.
- Provide clear and measurable accountability for managers and directors in assuming their responsibilities.
- Provide for fair and equitable treatment in all dealings between managers, directors, and shareholders.
- Have complete transparency and accuracy in disclosures regarding operations, performance, risk, and financial position.

### LOS 32.b

There are three major business forms:

- Sole proprietorship.
- Partnership.
- Corporation.

Corporations differ from sole proprietorships and partnerships in that the corporation is a separate legal entity from its owners.

### LOS 32.c

An agency relationship creates the potential for a principal-agent problem where the agent may act for his own well-being rather than that of the principal. There are two potential areas of conflict.

- Managers and shareholders: Shareholders want management to make decisions that maximize shareholder wealth, but managers, left on their own, may well make decisions that maximize their own wealth. Examples of ways that management may act for their own interests include using funds to expand the size of the firm, granting excessive compensation and perquisites, investing in risky ventures, or not taking enough risk.
- Directors and shareholders: The conflict between directors and shareholders occurs when directors align more with management interests rather than those of shareholders. The following factors may cause this to occur: lack of independence, board members have personal relationships with management, board members have consulting or other business agreements with the firm, interlinked boards, or directors are overcompensated.



**LOS 32.d**

The board of directors for a corporation has the responsibility to:

- Institute corporate values and corporate governance mechanisms that will ensure business is conducted in a proficient, ethical, and fair manner.
- Ensure firm compliance with all legal and regulatory requirements in a timely manner.
- Create long-term strategic objectives for the company that are consistent with the shareholders' best interests.
- Determine management's responsibilities and how they will be held accountable. Performance should be measured in all areas of a company's operations.
- Evaluate the performance of the chief executive officer (CEO).
- Require management to supply the board with complete and accurate information in order for the board to make decisions for which it is responsible.
- Meet regularly to conduct its normal business, and meet in extraordinary session if necessary.
- Ensure that board members are adequately trained.

**LOS 32.e**

Corporate governance best practices includes the following:

- 75% independent board members.
- CEO and Chairman are separate positions.
- Directors knowledgeable/experienced, serve on only two or three boards.
- Annual elections (not staggered).
- Evaluate/assess board annually.
- Meet annually without management.
- Independent directors with finance expertise on audit committee; meet auditors annually.
- Independent directors on nominating committee.
- Most senior manager pay is tied to performance.
- Board use independent/outside counsel.
- Board approves related-party transactions.

**LOS 32.f**

Investors and analysts should assess the following policies of corporate governance:

- Codes of ethics.
- Directors' oversight, monitoring, and review responsibilities.
- Management's responsibility to the board.
- Reports of directors' oversight and review of management.
- Board self-assessments.
- Management performance assessments.
- Director training.

**LOS 32.g**

Studies have shown that strong corporate governance increases profitability and returns to shareholders. Weak corporate governance systems decrease the value of a company by increasing financial disclosure risk, asset risk, liability risk, or strategic policy risk.

## CONCEPT CHECKERS

1. Which of the following is *least likely* to be a core attribute of an effective corporate governance system?
  - A. There is clear and measurable accountability for managers and directors in assuming their responsibilities.
  - B. Company management receives compensation that is fair and reflective of job performance.
  - C. Disclosures regarding operations and financial position are made with complete transparency and accuracy.
  
2. Charlene Harmon is meeting with her supervisor, Cipriano Bernal, about the implementation of a new corporate governance structure at their business. Bernal tells Harmon that there are two primary objectives of corporate governance:  
  
Objective 1: Eliminate or reduce conflicts of interest that are inherent with the corporate business form.  
  
Objective 2: Clearly define the responsibilities that managers and directors have to shareholders and other company stakeholders.  
  
Are Objectives 1 and 2 appropriate objectives of corporate governance?
  - A. Only Objective 1 is correct.
  - B. Only Objective 2 is correct.
  - C. Both are correct.
  
3. Which of the following situations is the *best* example of the principal-agent problem?
  - A. The senior management team of a supplier of condiments to the restaurant industry purchases a supplier of cups and napkins. The merger increases the size of the business by 50% and is immediately accretive to earnings per share.
  - B. Directors of a corporation for a large industrial company are required to sign an agreement that they will not serve as a director for any other firm.
  - C. The senior managers of a small biotechnology company consistently invest in drug processes that have small chances of success, but have the potential to generate huge profits if they do succeed. The bulk of management compensation comes in the form of executive stock options.

Use the following information to answer Questions 4 and 5.

The Brinley Corporation's Board of Directors recently engaged in an annual self-assessment. The written report of the self-assessment included the following four observations:

Observation 1: The independent directors meet in separate session without management on an as-needed basis.

Observation 2: Two of Brinley's ten directors are senior managers of the corporation.

Observation 3: Board members are elected on a staggered basis in which two directors are up for election each year.

Observation 4: Corporate counsel is always available for the Board of Directors to answer any legal questions that may arise.

4. Are observations 1 and 2 *likely* to be consistent with corporate governance best practice?
  - A. Both observations are correct.
  - B. Only one of the observations is correct.
  - C. Neither observation is correct.
5. Are observations 3 and 4 *likely* to be consistent with corporate governance best practice?
  - A. Both observations are correct.
  - B. Only one of the observations is correct.
  - C. Neither observation is correct.
6. Which of the following is *least likely* to be useful in evaluating a company's corporate governance system for the purpose of investment analysis?
  - A. Quarterly conference calls with analysts after earnings announcements.
  - B. Performance self-assessments from individual committees on the Board of Directors.
  - C. Statement of management's responsibilities to directors.
7. Which of the following statements concerning having a CEO serve as chairman of the board is *most accurate*? Having a CEO also serve as chairman is considered:
  - A. good corporate governance practice as the CEO is the best person to provide the board with information about the company's strategy and operations.
  - B. poor corporate governance practice as having the CEO serve as chairman is an inherent conflict when determining management compensation.
  - C. poor corporate governance practice as having the CEO and chairman serve as separate positions ensures a properly-functioning board.

## CHALLENGE PROBLEMS

8. Benjamin Myers is an analyst for Hanover Capital Management, an equity manager specializing in large capitalization growth stocks. Myers believes that investment results for the firm could be improved if a corporate governance assessment were included as part of the criteria for analyzing investment opportunities. In a memo used to convince his colleagues of the implications for corporate governance in company valuation, Myers makes two statements to support his claim that corporate governance is important for valuing a company:

Statement 1: The lack of a corporate governance structure increases the risk that financial statements will be materially misstated, and also increases the risk that company assets will be used for management's benefit.

Statement 2: Studies indicate that companies with effective corporate governance structures in place generate a higher return on equity than companies without a strong corporate governance system.

Do Myers' statements provide appropriate support for his claim?

- A. Both statements are correct.
- B. Only one of the statements is correct.
- C. Neither statement is correct.

Use the following information to answer Questions 9 and 10.

Regan Albright-Williams is the CEO for Karazim, a company that provides an Internet auction marketplace. Karazim was a private company for eight years, but recently had an IPO and became publicly traded. Albright-Williams has been with Karazim since it was founded. She is new to corporate governance requirements as this is her first time running a public company.

Albright-Williams' first task in setting up a corporate governance system is to formalize the structure for the board of directors. Karazim had an ad hoc board as a private company that consisted of five members of the Williams family. Two of these family members have worked for Karazim for the last eight years. She decides to invite all five of them to be on the new board. In order to meet a recommendation she read about in an article on corporate governance best practices, Albright-Williams also recruits ten independent board members who are not family members. She decides it would be best to have board members who are knowledgeable about both finance and the Internet auction business, so she decides to ask four bankers that have acted as ongoing lenders to Karazim over the past ten years to serve as board members. She also sends letters to six people she knows that serve on boards of other public companies who have a reputation for being respected business leaders. In her letter asking these individuals to serve on the board, Albright-Williams tells them that their commitment to the board will be for at least two years because members of the board of directors will be elected in even-numbered years.

Two of Karazim's Executive Vice Presidents were asked to make preparations for the first board meeting. Mark Davidson states, "we should send out a letter to investors introducing the new board members before the first meeting is convened." Jeff Pyle replies, "I think we should have a training session for the board members so they can perform their responsibilities to the board."

The primary task at the first board meeting is to finalize the board's committee structure. In the first order of business, Albright-Williams is appointed Chairman of the board. The nominating committee is formed with four directors, each of whom is independent. Finally, the audit committee is formed, with the company's CFO chairing the committee, and bankers who are lenders to the company taking the other four positions on the committee.

9. Which of the following pairs of concerns *most accurately* describes the problems with the structure that Albright-Williams has put together for the board of directors?
  - A. Five family members on the board does not meet the best practices concerning the proportion of independent board members, and lenders to the company cannot be classified as independent.
  - B. Two former employees on the board does not meet the best practices concerning the proportion of independent board members, and individuals that serve on boards for other companies cannot be classified as independent.
  - C. Two former employees on the board does not meet the best practices concerning the proportion of independent board members, and lenders to the company cannot be classified as independent.
10. Whose statements are *most* consistent with corporate governance best practice?
  - A. Albright-Williams' letter.
  - B. Davidson's statement.
  - C. Pyle's statement.
11. Activist shareholders are pressuring Yellow Frond, Inc., for a change in senior management after six consecutive quarters of poor earnings and a declining share price. The Board of Yellow Frond votes to enact a series of aggressive anti-takeover provisions with all independent directors dissenting, then resigning. This situation *most likely* indicates Yellow Frond has a:
  - A. principal agent problem.
  - B. disclosure assessment problem.
  - C. exogenous change problem.

**ANSWERS – CONCEPT CHECKERS**

1. **B** Although fair compensation for management that is reflective of job performance may result from an effective corporate governance system, it is not considered one of the core attributes.
2. **A** The objectives of corporate governance are to (1) eliminate or reduce conflicts of interest, particularly those between managers and shareholders, that are inherent with the corporate form of doing business, and (2) ensure that company assets are used in a manner consistent with the best interests of investors and other stakeholders.
3. **C** The principal-agent problem in a corporation refers to a situation where agents, such as management or directors, act in their own best interests rather than those of the principal (i.e., the shareholders). The best example of the principal-agent problem is the biotech company whose management generates big payoffs from their stock options if a risky project succeeds, but has little downside risk if the project fails. The condiment supplier to the restaurant industry seems to be engaging in a vertical merger that makes sense for shareholders. Having directors that are paid in stock is a way to align director interests with those of shareholders, and having directors only serve on one board is a means of having directors focus their energies on one firm.
4. **B** Observation 1 is not consistent because meetings of the independent directors should be held at least annually. Meeting on an as-needed basis is too vague. Best practice dictates that 75% of directors should be independent. In the case of Brinley, it appears 80% are independent, so Observation 2 is consistent.
5. **C** Observation 3 is not consistent because best practice calls for annual elections. Observation 4 is not consistent—boards should use independent counsel rather than corporate counsel for legal issues.
6. **A** Quarterly conference calls may be useful to learn about operations and management's assessment of the business environment, but of the choices listed, they are the least likely to provide information about a company's corporate governance practices.
7. **B** Having an individual serve the dual role of CEO and Chairman is considered a poor corporate governance practice. Not only does it cause a conflict of interest when determining management compensation, there is a concern that the CEO/Chairman could drive the board agenda and influence the boardroom culture, diminishing the independence of independent directors. Note that while separating the CEO and Chairman positions reduces potential questions about the board's commitment to shareholders, it does not guarantee the board will function properly.

**ANSWERS – CHALLENGE PROBLEMS**

8. A Both of Myers' statements about the valuation characteristics of corporate governance support his claim. The lack of corporate governance structure increases accounting risk and asset risk, which are both described in his statement, as well as liability risk and strategic policy risk. Companies with strong corporate governance systems have been shown in studies to have higher profitability measures such as ROE.
9. A The board structure that Karazim has proposed would consist of 15 board members. Former employees would not be considered independent, but having only two former employees on the board would be a ratio of 2:15, which would meet the best practice that at least 75% of the board members are independent. A bigger concern would be having five family members on the board, which would be one-third of the directors. In general, there is no problem with having directors that serve on other boards, however, if an individual serves on more than two or three boards, it raises the question of how much time they have to devote to each board. Another big concern would be having lenders serve on the board. If the lenders have an ongoing relationship with the company, they cannot be classified as independent.
10. C The statement in Albright-Williams' letter is inconsistent with corporate governance best practice. Although it is admirable that elections will not be staggered, best practice would have elections take place annually. Davidson's suggestion is a nice gesture, but it is incomplete—shareholders should be able to vote on the board members before the first meeting. Pyle's statement is most consistent with best practice—board members should be trained so they can adequately perform board functions.
11. A The internal board appears to be protecting management at the expense of shareholders; this is a principal agent problem. "Disclosure assessment" has little or no meaning in this context. An "exogenous change" (i.e., an SEC investigation) could help or hurt Yellow Frond shareholders, but has nothing to do with this topic review.

# MERGERS AND ACQUISITIONS

Study Session 9

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## EXAM FOCUS

This topic review is a corporate finance treatment of mergers and acquisitions, an important Level 2 topic. As you study this material, focus on how these concepts can be applied to the valuation process from the point of view of the analyst. When analysts analyze proposed mergers, they ask questions like the following: “Does this merger add value?”; “Does the justification for the merger proposed by management make sense?”; “Which company (the acquirer or the target) captures the value (if any) created by the merger?”; “How will the takeover defenses employed by the target firm affect the likelihood of the merger succeeding?” Pay particular attention to the three methods for valuing an M&A transaction and make sure you know how to evaluate a merger bid. These topics have important links to other places in the Level 2 curriculum, particularly the equity valuation material, and are therefore likely exam topics.

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## WARM-UP: BACKGROUND ON MERGERS AND ACQUISITIONS

The term mergers and acquisitions, or M&A for short, generally refers to two businesses combining in some manner. Many companies use M&A activities as a way to achieve growth, while others may use M&A to diversify their businesses. In any case, M&A activities are one of the most controversial topics in finance and are associated with complex legal, tax, and synergistic issues. A casual reading of the headlines indicates that mergers and acquisitions take a variety of forms (e.g., friendly or hostile), but almost always someone is left unhappy (usually the managers that are removed, or workers that will be laid off).

Although “M&A” is often used as a generic term that refers to any business combination, we can differentiate between mergers and acquisitions. An **acquisition** refers to one company buying only part of another company. A typical acquisition transaction may involve the purchase of assets or a distinct business segment (e.g., subsidiary) from another company. If the acquirer absorbs the entire target company, the transaction is considered a **merger**. Once a merger is completed, only one company will remain, and the other will cease to exist. Whether a transaction is called a merger or an acquisition, the initiator of the venture is referred to as the bidder, or **acquirer**, while the opposite side of the transaction is known as the **target**.

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### LOS 33.a: Categorize merger and acquisition (M&A) activities based on forms of integration and types of mergers.

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There are a variety of ways to classify merger and acquisition activities. For the exam, you should be able to classify M&A activities based on how the companies physically come together (e.g., forms of integration) and on how the companies’ business activities relate to one another (e.g., types of mergers).



## Forms of Integration

In a **statutory merger**, the acquiring company acquires all of the target's assets and liabilities. As a result, the target company ceases to exist as a separate entity. Note that in a statutory merger, the target company is usually smaller than the purchaser, but this is not always the case.

In a **subsidiary merger**, the target company becomes a subsidiary of the purchaser. Most subsidiary mergers typically occur when the target has a well-known brand that the acquirer wants to retain (e.g., Proctor and Gamble buying Gillette).

With a **consolidation**, both companies cease to exist in their prior form, and they come together to form a completely new company. Consolidations are common in mergers when both companies are of a similar size.

## Types of Mergers

In a **horizontal merger**, the two businesses operate in the same or similar industries, and may often be competitors. Therefore, if BurgerWorld and World of Burgers were to merge, the basic operations of the new firm would be very similar to those of the separate entities.

In a **vertical merger**, the acquiring company seeks to move up or down the product supply chain. For example, an ice cream manufacturer decides to acquire a restaurant chain so it can have an outlet for its products and not rely on supermarkets or other restaurants. This is an example of forward integration, where the acquirer is moving up the supply chain toward the ultimate consumer. If the same ice cream manufacturer purchases a farm so it can supply its own milk and cream for its products, it is called backward integration because the company is moving down the supply chain toward the raw material inputs.

In a **conglomerate merger**, the two companies operate in completely separate industries. As such, there are expected to be few, if any, synergies from combining the two companies. For example, BurgerWorld's decision to venture into the oil exploration business via acquisition represents a conglomerate merger because there are no apparent benefits (other than perhaps feeding hungry workers).

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### LOS 33.b: Explain the common motivations behind M&A activity.

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Managers often cite a variety of reasons for mergers and acquisitions. Some of these explanations make economic sense (i.e., they create synergies and are a source of added value) and some do not. Analysts and investors should carefully evaluate the motivation for a merger, keeping in mind there may be several motives and that some motives may be interrelated.

*Synergies.* The most common motivation for a merger is the idea that it will create synergies in which the combined company will be worth more than the two companies would be worth if operating separately. Usually, synergy results from either reducing costs or increasing revenues. Cost synergies are exactly the strategy behind a pure horizontal merger. On the surface, who can argue with increasing economies of scale? This is one of the basic principles of microeconomics. Imagine this scenario: two firms plan to combine even though there is no expected increase in sales. If the new entity can reduce the combined fixed costs (via elimination of duplicate functions), the average cost per unit will decrease by spreading the now lower fixed costs over the same number of units. Of course, it is easier said than done to eliminate duplicate functions and integrate the remaining business functions. Revenue synergies are typically created by cross-selling products, increasing market share, or raising prices to take advantage of reduced competition.

*Achieving more rapid growth.* External growth via M&A activity is usually a much faster way for managers to increase revenues than making investments internally (e.g., organic growth). Growth through M&A is especially common in mature industries where organic growth opportunities are limited. In addition, it is typically a less risky way to generate growth by acquiring resources through a merger with another company rather than developing them internally.

*Increased market power.* When a horizontal merger occurs in an industry with few competitors, the newly combined company will typically come away with increased market share and a greater ability to influence market prices. Vertical mergers may also increase market power by reducing dependence on outside suppliers. For example, if a company acquires a key supplier of raw materials, it can guarantee that materials will be available in its own production process and potentially lock out competing firms who may rely on the same raw materials. By controlling critical supply inputs, the firm can influence industry output and market prices. Regulators closely scrutinize both horizontal and vertical mergers to make sure the combined company does not gain too much market power, which could potentially harm consumers.



*Professor's Note:* The Herfindahl-Hirschman Index is often used as a measure of market power resulting from a merger. Government regulation is also discussed in Study Session 4.

*Gaining access to unique capabilities.* If a company is lacking a specific capability or resource (e.g., research and development or intellectual capital), it can either try to develop it internally or seek to acquire something that already exists. M&A activity can be a cost effective way to acquire proven capabilities or resources.

*Diversification.* Managers may cite the need to diversify the firm's cash flows as grounds for a merger. This makes no sense for shareholders but may be rational for the managers. It is much easier and cheaper for the shareholders to diversify simply by investing in the shares of unrelated companies themselves rather than having one company go through the long, expensive process of acquiring and merging the two firms' operations and corporate cultures. In fact, research has revealed that conglomerates trade at a discount relative to the sum of the value of individual businesses. In this case, the whole is *less*

than the sum of the individual parts. This finding demonstrates that mergers are not likely to increase value purely for diversification reasons.

*Bootstrapping EPS.* Another motivation for mergers is the bootstrapping effect on earnings per share that sometimes results from a stock deal. Bootstrapping is discussed in the next LOS.

*Personal benefits for managers.* Studies concerning executive compensation find there is a high correlation between the size of a company and how much a manager is paid. This means that there is a strong financial incentive for managers to maximize the size of the firm rather than shareholder value. In addition, being part of the executive team for a larger company implies greater power and prestige and is probably good for managerial egos.



*Professor's Note: The tendency of managers to maximize their own wealth rather than shareholders' wealth is an example of an agency problem, discussed in the previous topic review of Corporate Governance.*

*Tax benefits.* Consider the case of two companies where one has large amounts of taxable income and the other has accumulated large tax loss carryforwards. By merging with the company that has tax losses, the acquirer can use the losses to lower its tax liability. Regulators typically do not approve mergers that are undertaken purely for tax reasons, but with the many potential motivations to enter into a merger, proving that tax reasons are the key factor is difficult.

*Unlocking hidden value.* When a company has struggled for an extended period of time, an acquirer may believe it can pay a lower price to buy the company and unlock hidden value by improving management, adding resources, or improving the organizational structure. In some cases, a merger may occur because the acquirer believes it is purchasing assets for less than their replacement cost. For example, a manufacturing company may be able to acquire an existing production process for less than it would cost to develop the process on its own.

*Achieving international business goals.* Since the 1990s, international M&A deals have become an important way for multinational companies to achieve cross-border business goals. Many of these goals reflect the same motivations behind domestic mergers, such as extending global market power or gaining access to unique capabilities. However, there are a number of factors driving international M&A that are specific to international business:

- *Taking advantage of market inefficiencies.* Acquiring a manufacturing plant in a country where labor costs are less expensive is a prime example of gaining an advantage from an inefficient global marketplace.
- *Working around disadvantageous government policies.* International M&A is a potential way to overcome barriers to free trade, such as tariffs or quotas.
- *Use technology in new markets.* A company with an exciting new technology may acquire companies in other countries in order to gain access to new markets where the technology can be marketed.

- *Product differentiation.* Buying foreign companies can help firms with a unique line of products expand their competitive advantage.
- *Provide support to existing multinational clients.* Companies may wish to gain a presence overseas in order to maintain or expand an existing relationship with a client who has multinational operations.

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**LOS 33.c: Illustrate how earnings per share (EPS) bootstrapping works and calculate a company's postmerger EPS.**

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*Professor's Note: The term "bootstrapping" as used here is not the same as the fixed income topic of bootstrapping forward rates from Level 1.*

**Bootstrapping** is a way of packaging the combined earnings from two companies after a merger so that the merger generates an increase in the earnings per share of the acquirer, even when no real economic gains have been achieved.

The "bootstrap effect" occurs when a high-growth prospects firm (high P/E) acquires a low-growth prospects firm (low P/E) in a stock transaction. Post-merger, the earnings of the combined firm are simply the sum of the respective earnings prior to the merger. However, by purchasing the firm with a lower P/E, the acquiring firm is essentially exchanging higher-priced shares for lower-priced shares. As a result, the number of shares outstanding for the acquiring firm increases, but at a ratio that is less than 1-for-1. When we compute the EPS for the combined firm, the numerator (total earnings) is equal to the sum of the combined firms, but the denominator (total shares outstanding) is less than the sum of the combined firms. The result is a higher reported EPS, even when the merger creates no additional synergistic value.

**Example: Bootstrapping earnings per share**

Fastgro, Inc., is planning to acquire Slowgro, Inc., in a merger transaction. Financial information for the two companies both prior to and after the merger are shown in the following table. Calculate Fastgro's post-merger EPS and determine whether the merger created economic gains.

**Financial Information for Fastgro and Slowgro**

	<i>Fastgro, Inc.</i>	<i>Slowgro, Inc.</i>	<i>Fastgro–Post Merger</i>
Stock Price	\$80.00	\$40.00	\$80.00
EPS	\$3.00	\$2.00	
P/E Ratio	26.7	20.0	
Total shares outstanding	200,000	100,000	250,000
Total earnings	\$600,000	\$200,000	\$800,000
Market capitalization	\$16,000,000	\$4,000,000	\$20,000,000

**Answer:**

Given Fastgro's stock price of \$80, it can issue 50,000 new shares and use the proceeds to buy Slowgro ( $\$4,000,000 / \$80 = 50,000$  shares). The total shares outstanding for the post-merger Fastgro will be 250,000, which consists of Fastgro's original 200,000 shares and the newly issued 50,000 shares. If we divide the post-merger combined earnings of \$800,000 by the 250,000 shares outstanding, we compute Fastgro's post-merger EPS as \$3.20, which is \$0.20 higher per share than Fastgro would have reported before the merger.

However, no economic value was created by the merger because the market capitalization of Fastgro post-merger is equal to the sum of the two companies' values prior to the merger ( $\$16 + \$4 = \$20$  million).

The apparent growth in EPS through bootstrapping was *not* the result of growth in earnings through capital investment, increased corporate efficiency, or synergistic gains, but rather from the accounting involved in a stock merger with a low-growth firm. In an efficient market, the post-merger P/E should adjust to the weighted average of the two companies' contributions to the post-merger company's total earnings. In our example, this would mean that the post-merger P/E would be about 25, which would imply that Fastgro's stock price would remain at \$80 after the merger.

In practice, the market tends to recognize the bootstrapping effect and post-merger P/E's adjust accordingly. However, there have been periods in history, such as the technology bubble in the late 1990s, where bootstrapping helped high P/E companies show EPS growth, even in cases where the mergers created no value for shareholders.

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### LOS 33.d: Discuss the relation between merger motivations and types of mergers based on industry life cycles.

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The industry life cycle recognizes that industries go through certain phases based on their rates of growth. The motivations that a company may have for entering into a merger and the type of merger can depend a great deal on what phase of the industry life cycle the company is in.

*Pioneer/development phase.* In the pioneer phase, it is generally still uncertain whether consumers will accept a firm's product or service. The industry typically has large capital needs to fund development, but is not generating profits. In this stage, younger, smaller companies may seek to sell themselves to larger, more mature companies that have ample resources and want to find a new growth opportunity, or they may merge with a similar firm that will allow both companies to share management talents and financial resources. As a result, the common types of mergers seen in this stage are conglomerate mergers and horizontal mergers.

*Rapid growth phase.* The rapid growth phase is characterized by high profit margins and accelerating sales and earnings. The product or service provided by the company is accepted by consumers, but there is little competition in the industry. Merger

motivations in this stage are usually driven by capital requirements as companies look for more resources to finance their expansion. The common types of mergers seen in this stage are conglomerates, as larger, more mature companies are able to provide capital, and horizontal mergers as similar firms combine resources to finance further growth.

*Mature growth phase.* In the mature phase, new competition has reduced industry profit margins, but the potential still exists for above-average growth. Merger motivations are generally focused on operational efficiencies as companies seek to generate economies of scale to reduce costs to keep profit margins high. As a result, horizontal and vertical mergers that provide synergies and expand market power are most common in this phase.

*Stabilization phase.* In the stabilization phase, competition has eliminated most of the growth potential in the industry, and the rate of growth is in line with that of the overall economy. Companies in this phase seek mergers to generate economies of scale in order to compete with a lower cost structure. They may also acquire smaller companies that can provide stronger management and a wider financial base. In this phase, horizontal mergers are the most common as the strongest companies acquire the weaker companies to consolidate market share and reduce costs.

*Decline phase.* The decline phase is characterized by overcapacity, declining profit margins, and lower demand as tastes may have changed and consumers seek new technologies. In this stage, all three types of mergers are common. A company may seek a horizontal merger simply to survive, vertical mergers may be used to increase efficiencies and increase profit margins, and conglomerate mergers may occur as companies acquire smaller companies in different industries to try to find new growth opportunities. Figure 1 summarizes this discussion.

**Figure 1: Merger Motivations in the Industry Life Cycle**

<i>Industry Life Cycle Stage</i>	<i>Industry Characteristics</i>	<i>Merger Motivations</i>	<i>Common Types of Mergers</i>
Pioneer/ development	<ul style="list-style-type: none"> <li>• Unsure of product acceptance</li> <li>• Large capital requirements and low profit margins</li> </ul>	<ul style="list-style-type: none"> <li>• Gain access to capital from more mature businesses</li> <li>• Share management talent</li> </ul>	<ul style="list-style-type: none"> <li>• Conglomerate</li> <li>• Horizontal</li> </ul>
Rapid growth	<ul style="list-style-type: none"> <li>• High profit margins</li> <li>• Accelerating sales and earnings</li> <li>• Competition still low</li> </ul>	<ul style="list-style-type: none"> <li>• Gain access to capital</li> <li>• Expand capacity to grow</li> </ul>	<ul style="list-style-type: none"> <li>• Conglomerate</li> <li>• Horizontal</li> </ul>
Mature growth	<ul style="list-style-type: none"> <li>• Lots of new competition</li> <li>• Still opportunities for above average growth</li> </ul>	<ul style="list-style-type: none"> <li>• Increase operational efficiencies</li> <li>• Economies of scale/synergies</li> </ul>	<ul style="list-style-type: none"> <li>• Horizontal</li> <li>• Vertical</li> </ul>
Stabilization	<ul style="list-style-type: none"> <li>• Competition has reduced growth potential</li> <li>• Capacity constraints</li> </ul>	<ul style="list-style-type: none"> <li>• Economies of scale/reduce costs</li> <li>• Improve management</li> </ul>	<ul style="list-style-type: none"> <li>• Horizontal</li> </ul>
Decline	<ul style="list-style-type: none"> <li>• Consumer tastes have shifted</li> <li>• Overcapacity/shrinking profit margins</li> </ul>	<ul style="list-style-type: none"> <li>• Survival</li> <li>• Operational efficiencies</li> <li>• Acquire new growth opportunities</li> </ul>	<ul style="list-style-type: none"> <li>• Horizontal</li> <li>• Vertical</li> <li>• Conglomerate</li> </ul>

**LOS 33.e: Contrast merger transaction characteristics by form of acquisition, method of payment, and attitude of target management.**

The characteristics of a merger transaction are important because they largely determine how the transaction will take place, how it will be valued, and what regulatory and tax rules will apply.

### Form of Acquisition

The two basic forms of acquisition are a stock purchase or an asset purchase.



In a **stock purchase**, the acquirer gives the target firm's shareholders cash and/or securities in exchange for shares of the target company's stock. There are several important issues regarding stock purchases of which you should be aware.

- With a stock purchase, it is the shareholders that receive compensation, not the company itself. As a result, shareholders must approve the transaction with at least a majority shareholder vote (sometimes it's more than a majority, depending on the law where the merger takes place). Winning shareholder approval can be time consuming; but if the merger is hostile, dealing directly with shareholders is a way to avoid negotiations with management.
- Also, shareholders will bear any tax consequences associated with the transaction. Shareholders must pay tax on gains, but there are no taxes at the corporate level. If the target company has accumulated tax losses, a stock purchase benefits the shareholders because under U.S. rules, the use of a target's tax losses is allowable for stock purchases, but not for asset purchases.
- Finally, most stock purchases involve purchasing the entire company and not just a portion of it. This means that not only will the acquirer gain the target company's assets, but it will also assume the target's liabilities.

In an **asset purchase**, the acquirer purchases the target company's assets, and payment is made directly to the target company.

- Unless the assets are substantial (e.g., more than 50% of the company), shareholder approval is generally not required.
- Also, because payment is made to the company, there are no direct tax consequences for the shareholder. The target company will pay any capital gains taxes associated with the transaction at the corporate level.
- Asset purchase acquisitions usually focus on specific parts of the company that are of particular interest to the acquirer, rather than the entire company, which means that the acquirer generally avoids assuming any of the target company's liabilities. However, an asset purchase for the sole purpose of avoiding the assumption of liabilities is generally not allowed from a legal standpoint. Figure 2 summarizes the key differences between stock purchase and an asset purchase.

**Figure 2: Key Differences Between Forms of Acquisition**

	<i>Stock Purchase</i>	<i>Asset Purchase</i>
Payment	Made directly to target company shareholders in exchange for their shares	Made directly to target company
Approval	Majority shareholder approval required	No shareholder approval needed unless asset sale is substantial
Corporate taxes	None	Target company pays capital gains taxes
Shareholder taxes	Shareholders pay capital gains tax	None
Liabilities	Acquirer assumes liabilities of target	Acquirer usually avoids assumption of target's liabilities



## Method of Payment

The two basic methods of payment are a securities offering and a cash offering. We will discuss these two methods of payment separately; but you should know that in many cases, mergers will use a combination of the two, which is referred to a mixed offering.

In a **securities offering**, the target shareholders receive shares of the acquirer's common stock in exchange for their shares in the target company. The number of the acquirer's shares received for each target company share is based on the *exchange ratio*. For example, shareholders in the target company may receive 1.3 shares of the acquirer's stock for every one share they own in the target company. In practice, exchange ratios are negotiated in advance of a merger due to the daily fluctuations that can occur in stock prices. The total compensation ultimately paid by the acquirer in a stock offering is based on three factors: the exchange ratio, the number of shares outstanding of the target company, and the value of the acquirer's stock on the day the deal is completed.

**Cash offerings** are straight forward in that the acquirer simply pays an agreed upon amount of cash for the target company's shares.

When an acquirer is negotiating with a target over the method of payment, there are three main factors that should be considered:

1. *Distribution between risk and reward for the acquirer and target shareholders.* In a stock offering, since the target company's shareholders receive new shares in the post-merger company, they share in the risk related to the ultimate value that is realized from the merger. In a cash offering, all of the risk related to the value of the post-merger company is borne by the acquirer. As a result, when the acquirer is highly confident in the synergies and value that will be created by the merger, it is more inclined to push for a cash offering.
2. *Relative valuations of companies involved.* If the acquirer's shares are considered overvalued by the market, the acquirer is likely to want to use its overpriced shares as currency in the merger transaction. In fact, investors sometimes interpret a stock offering as a signal that the acquirer's shares may be overvalued.
3. *Changes in capital structure.* Different payment structures have an impact on the acquiring firm's capital structure. If the acquirer borrows money to raise cash for a cash offering, the associated debt will increase the acquirer's financial leverage and risk. Issuing new stock for a securities offering can dilute the ownership interest for the acquirer's existing shareholders.

## Attitude of Target Management

A merger offer will be viewed as either friendly or hostile by the target company's management. Management's attitude toward the merger offer is important because it shapes how the merger is completed and the process that is followed.

**Friendly merger offers** usually begin with the acquirer directly approaching the target's management. If both parties like the idea of a potential deal, they will negotiate the method of payment and the terms of the transaction. At this point, each party to the

merger will conduct due diligence on the other party by examining financial statements and other records. The goal of the due diligence process is for each party to protect its shareholders by confirming the accuracy of assertions made during negotiations. The acquirer will want to make sure the target's assets truly exist, while the target will want to make sure the acquirer has the financial capacity to pay for the transaction. Once the negotiation and due diligence process is complete, attorneys draft a *definitive merger agreement* that outlines the terms of the transaction and the rights of each party.

So far, the entire process for the merger has been kept secret from the general public in order to avoid violating securities laws related to material insider information. Only when each party signs the definitive merger agreement is the transaction announced to the public. In a friendly merger, the announcement is accompanied by an endorsement of the merger from the target's management and board of directors to encourage target shareholders to vote for the deal. The target company's shareholders are then given a proxy statement that outlines all of the pertinent facts of the transaction. Once it has been approved by shareholders and regulators, payment is made, and the deal is complete.

**Hostile merger offers** typically follow a much different process than friendly mergers. If the target company's management does not support the deal, the acquirer submits a merger proposal directly to the target's board of directors in a process called a *bear hug*.

If the bear hug is unsuccessful, the next step is to appeal directly to the target's shareholders using one of two methods—a tender offer or a proxy battle.

- In a *tender offer*, the acquirer offers to buy the shares directly from the target shareholders, and each individual shareholder either accepts or rejects the offer.
- In a *proxy battle*, the acquirer seeks to control the target by having shareholders approve a new "acquirer approved" board of directors. A proxy solicitation is approved by regulators and then sent to the target's shareholders. If the shareholders elect the acquirer's slate of directors, the new board may replace the target's management and the merger offer may become friendly.

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### LOS 33.f: Distinguish and describe pre-offer and post-offer takeover defense mechanisms.

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Managers can be very creative when it comes to employing defensive measures to resist a hostile takeover. These measures can be divided into two classes: (1) pre-offer defenses and (2) post-offer defenses. As the terms imply, defensive measures can be taken either before or after a hostile offer takes place, but most M&A legal experts recommend that defenses are set up before an offer occurs, because pre-offer defenses tend to face less scrutiny in court.

#### Pre-Offer Defense Mechanisms

**Poison pill.** Poison pills are extremely effective anti-takeover devices and were the subject of many legal battles in their infancy. In its most basic form, a poison pill gives current shareholders the right to purchase additional shares of stock at extremely attractive prices (e.g., discount to current market value), which causes dilution and effectively increases

the cost to the potential acquirer. The pills are usually triggered when a shareholder's equity stake exceeds some threshold level (e.g., 10%). Specific forms of a poison pill are a *flip-in pill*, where the target company's shareholders have the right to buy the target's shares at a discount, and a *flip-over pill*, where the target's shareholders have the right to buy the acquirer's shares at a discount. In case of a friendly merger offer, most poison pill plans give the board of directors the right to redeem the pill prior to a triggering event. This is called a *dead-hand* provision.

**Poison put.** This anti-takeover device is different from the others, as it focuses on bondholders. These puts give bondholders the option to demand immediate repayment of their bonds if there is a hostile takeover. This additional cash burden may fend off a would-be acquirer.

**States with restrictive takeover laws.** Companies in the United States are incorporated in specific states, and the rules of that state apply to the corporation. Some states are more *target friendly* than others when it comes to having rules to protect against hostile takeover attempts. Companies that want to avoid a potential hostile merger offer may seek to reincorporate in a state that has enacted strict anti-takeover laws. Historically, Ohio and Pennsylvania have been considered to provide target companies with the most protection.

**Staggered board.** In this strategy, the board of directors is split into roughly three equal-sized groups. Each group is elected for a 3-year term in a staggered system: in the first year the first group is elected, the following year the next group is elected, and in the final year the third group is elected. The implications are straight-forward. In any particular year, a bidder can win at most one-third of the board seats. It would take a potential acquirer at least two years to gain majority control of the board since the terms are overlapping for the remaining board members. This is usually longer than a bidder would want to wait and can deter a potential acquirer.

**Restricted voting rights.** Equity ownership above some threshold level (e.g., 15% to 20%) triggers a loss of voting rights unless approved by the board of directors. This greatly reduces the effectiveness of a tender offer and forces the bidder to negotiate with the board of directors directly.

**Supermajority voting provision for mergers.** A supermajority provision in the corporate charter requires shareholder support in excess of a simple majority. For example, a supermajority provision may require 66.7%, 75%, or 80% of votes in favor of a merger. Therefore, a simple majority shareholder vote of 51% would still fail under these supermajority limits.

**Fair price amendment.** A fair price amendment restricts a merger offer unless a *fair* price is offered to current shareholders. This fair price is usually determined by some formula or independent appraisal.

**Golden parachutes.** Golden parachutes are compensation agreements between the target and its senior management that give the managers lucrative cash payouts if they leave the target company after a merger. In practice, payouts to managers are generally not big enough to stop a large merger deal, but they do ease the target management's concern about losing their jobs.



*Professor's Note: In many cases, some of these pre-offer defenses are used in combination with each other. A hostile takeover attempt of a company that has restricted voting rights and a supermajority provision means that an acquirer could lose voting rights while acquiring shares, but still need an 80% approval for the merger to go through.*

## Post-Offer Defense Mechanisms

**“Just say no” defense.** The first step in avoiding a hostile takeover offer is to simply say no. If the potential acquirer goes directly to shareholders with a tender offer or a proxy fight, the target can make a public case to the shareholders concerning why the acquirer’s offer is not in the shareholder’s best interests.

**Litigation.** The basic idea is to file a lawsuit against the acquirer that will require expensive and time-consuming legal efforts to fight. The typical process is to attack the merger on anti-trust grounds or for some violation of securities law. The courts may disallow the merger or provide a temporary injunction delaying the merger, giving managers more time to load up their defense or seek a friendly offer from a *white knight*, as discussed later in this LOS.

**Greenmail.** Essentially, greenmail is a payoff to the potential acquirer to terminate the hostile takeover attempt. Greenmail is an agreement that allows the target to repurchase its shares from the acquiring company at a premium to the market price. The agreement is usually accompanied by a second agreement that the acquirer will not make another takeover attempt for a defined period of time. Greenmail used to be popular in the United States in the 1980s, but it has been rarely used after a 1986 change in tax laws added a 50% tax on profits realized by acquirers through greenmail.

**Share repurchase.** The target company can submit a tender offer for its own shares. This forces the acquirer to raise its bid in order to stay competitive with the target’s offer and also increases the use of leverage in the target’s capital structure (less equity increases the debt/equity ratio), which can make the target a less attractive takeover candidate.

**Leveraged recapitalization.** In a leveraged recapitalization, the target assumes a large amount of debt that is used to finance share repurchases. Like the share repurchase, the effect is to create a significant change in capital structure that makes the target less attractive while delivering value to shareholders.

**Crown jewel defense.** After a hostile takeover offer, a target may decide to sell a subsidiary or major asset to a neutral third party. If the hostile acquirer views this asset as essential to the deal (e.g., *crown jewel*), then it may abandon the takeover attempt. The risk here is that courts may declare the strategy illegal if a significant asset sale is made after the hostile bid is announced.

**Pac-man defense.** In the video game Pac-Man, electronic ghosts would try to eat the main character, but after eating a power pill, Pac-Man would turn around and try to eat the ghosts. The analogy applies here. After a hostile takeover offer, the target can defend itself by making a counteroffer to acquire the acquirer. In practice, the Pac-man defense is rarely used because it means a smaller company would have to acquire a larger

company, and the target may also lose the use of other defense tactics as a result of its counteroffer.

**White knight defense.** A white knight is a friendly third party that comes to the rescue of the target company. The target will usually seek out a third party with a good strategic fit with the target that can justify a higher price than the hostile acquirer. In many cases, the white knight defense can start a bidding war between the hostile acquirer and the third party, resulting in the target receiving a very good price when a deal is ultimately completed. This tendency for the winner to overpay in a competitive bidding situation is called the *winner's curse*.

**White squire defense.** In medieval times, a squire was a *junior knight*. In today's M&A world, the squire analogy means that the target seeks a friendly third party that buys a minority stake in the target without buying the entire company. The idea is for the minority stake to be big enough to block the hostile acquirer from gaining enough shares to complete the merger. In practice, the white squire defense involves a high risk of litigation, depending on the details of the transaction, especially if the third party acquires shares directly from the company and the target's shareholders do not receive any compensation.

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### LOS 33.g: Summarize U.S. antitrust legislation.

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Antitrust laws are designed to stop mergers and acquisitions that may hinder healthy competition. These laws have been in place to protect consumers since 1890, but they have evolved over time. The following timeline outlines the major landmarks in antitrust legislation in the United States:

- *1890: The Sherman Antitrust Act* made any contracts or combinations that attempted to restrain trade or create a monopoly in an industry illegal. The Act was ineffective because the U.S. Department of Justice lacked enough resources to enforce it. Within a few years, the Sherman Act was challenged in the courts and deemed unenforceable due to ambiguous wording.
- *1914: The Clayton Antitrust Act* was passed to improve upon the Sherman Act by detailing specific business practices deemed illegal. In order to enforce the new law, the Federal Trade Commission Act of 1914 was also enacted to create the Federal Trade Commission (FTC) as a regulatory agency to work with the U.S. Department of Justice.
- *1950: The Celler-Kefauver Act* was passed to address weaknesses in the Clayton Act. For example, the Clayton Act only regulated stock purchases, and not asset purchases. Celler-Kefauver closed this loophole and also added new rules to address antitrust behavior pertaining to vertical and conglomerate mergers.
- *1976: The Hart-Scott-Rodino Antitrust Improvements Act of 1976* required all potential mergers to be reviewed and approved of in advance by the FTC and the Department of Justice. Prior to 1976, a merged company had to be disassembled after the fact if the merger was deemed anticompetitive.

Other countries have antitrust laws similar to those in the United States. For example, the European Commission has authority similar to the FTC to review mergers in the European Union. As globalization makes cross-border mergers more common, some

merger deals must be approved by multiple regulatory authorities that may all have different standards and filing requirements.

LOS 33.h: Calculate the Herfindahl–Hirschman Index and evaluate the likelihood of an antitrust challenge for a given business combination.

In 1982, the **Herfindahl-Hirschman Index (HHI)** replaced market share as the key measure of market power for determining potential antitrust violations. The HHI is calculated as the sum of the squared market shares for all firms within an industry.

$$HHI = \sum_{i=1}^n (MS_i \times 100)^2$$

where:  
 $MS_i$  = market share of firm  $i$   
 $n$  = number of firms in the industry

Regulators initially focus on what the HHI computation would be *after the merger takes place*. If the post-merger HHI is less than 1,000, the industry is considered competitive and an antitrust challenge is unlikely. A post-merger HHI value between 1,000 and 1,800 will place the industry in the *moderately concentrated* category. In this case, regulators will compare the pre-merger and post-merger HHI. If the change is greater than 100 points, the merger is likely to be challenged on antitrust grounds. A post-merger HHI calculation greater than 1,800 implies a highly concentrated industry. Regulators will again compare the pre-merger and post-merger HHI calculations, but in this case, if the change is greater than 50, the merger is likely to be challenged. The guidelines for determining the likelihood of an antitrust challenge are summarized in Figure 3.

Figure 3: HHI Concentration Level and Likelihood of Antitrust Action

<i>Post-Merger HHI</i>	<i>Industry Concentration</i>	<i>Change in Pre- and Post-Merger HHI</i>	<i>Antitrust Action</i>
Less than 1,000	Not concentrated	Any amount	No action
Between 1,000 and 1,800	Moderately concentrated	100 or more	Possible antitrust challenge
Greater than 1,800	Highly concentrated	50 or more	Antitrust challenge virtually certain

**Example: Herfindahl-Hirschman Index in a competitive market**

Assume there are 20 firms in the industry, each with a 5% market share. Also assume that firms 19 and 20 decide to merge. Calculate the pre-merger and post-merger Herfindahl-Hirschman Index and discuss the likelihood of an antitrust challenge of the merger.

**Answer:**

$$\text{Pre-merger HHI} = (0.05 \times 100)^2 \times 20 = 500$$

$$\text{Post-merger HHI} = [(0.05 \times 100)^2 \times 18] + (0.10 \times 100)^2 = 550$$

Since the post-merger HHI < 1,000, the market is not considered to be concentrated and an antitrust challenge is unlikely. Note that since the post-merger HHI is lower than the 1,000 threshold, there is no need to consider the pre-merger HHI and the change between the two values.

**Example: Herfindahl-Hirschman Index in a concentrated market**

Assume there are five firms in the industry, each with a 20% market share. Also assume that firms 4 and 5 decide to merge. Calculate the pre-merger and post-merger Herfindahl-Hirschman Index and discuss the likelihood of an antitrust challenge for the merger.

**Answer:**

$$\text{Pre-merger HHI} = (0.20 \times 100)^2 \times 5 = 2,000$$

$$\text{Post-merger HHI} = [(0.20 \times 100)^2 \times 3] + (0.40 \times 100)^2 = 2,800$$

Since the post-merger HHI > 1,800, the market is considered concentrated and an anti-trust challenge is likely. Also, the difference between the pre-merger and post-merger HHI is much greater than the threshold of 50, making an antitrust challenge virtually certain.

**Valuing a Target Company**

The three basic methods that analysts use to value target companies in an M&A transaction are: (1) discounted cash flow analysis, (2) comparable company analysis, and (3) comparable transaction analysis. In the following discussion, we will explain how each method works, and then compare the three methods.



### LOS 33.j: Calculate free cash flows for a target company and estimate the company's intrinsic value based on discounted cash flow analysis.

**Discounted cash flow (DCF)** analysis in the M&A context is very similar to the free cash flow to the firm (FCFF) approach discussed in Study Session 12. First, we want to determine the expected future free cash flows available to all investors after making necessary expenditures (e.g., working capital, capex) for the firm to continue as a going concern. From there, we want to discount these cash flows to back to the present at the appropriate discount rate.

To calculate **free cash flow (FCF)** for a target company and estimate its value using DCF analysis, we can use the following steps:

- Step 1: Determine which free cash flow model to use for the analysis.* Basic free cash flow models come in two-stage or three-stage varieties. To make things easy for our discussion here, we will use a two-stage model that estimates the company's cash flows during a high growth phase and a stable growth phase.
- Step 2: Develop pro forma financial estimates.* These projected financial statements form the estimates that are the basis for our analysis.
- Step 3: Calculate free cash flows using the pro forma data.* Starting with net income, we can calculate free cash flows as:

$$\begin{aligned}
 & \text{Net Income} \\
 & + \text{Net interest after tax} \\
 & = \text{Unlevered net income} \\
 & \pm \text{Change in deferred taxes} \\
 & = \text{Net operating profit less adjusted taxes (NOPLAT)} \\
 & + \text{Net noncash charges} \\
 & \pm \text{Change in net working capital} \\
 & - \text{Capital expenditures (capex)} \\
 & = \text{Free cash flow (FCF)}
 \end{aligned}$$

where:

$$\begin{aligned}
 \text{net working capital} &= \text{current assets (excluding cash and equivalents)} \\
 &\quad - \text{current liabilities (excluding short-term debt)} \\
 \text{net interest after tax} &= (\text{interest expense} - \text{interest income})(1 - \text{marginal tax rate})
 \end{aligned}$$

Note that unlevered net income also equals earnings before interest and taxes multiplied by 1 minus the tax rate and that you may be required to *back into* the tax rate by dividing taxes by net income before tax.



*Professor's Note: We will present a different version of free cash flow valuation in Study Session 12. You can work the corporate finance problems using the formula in Study Session 12 if you are provided the inputs that allow you to do so. However, if you encounter a corporate finance question on the exam, it is likely you will be provided with data using the terms from this topic review (e.g., unlevered net income, NOPLAT, etc.). In that case it is likely to be easier to use the formula presented here.*



Recall the FCFF formula from Study Session 12:

$$FCFF = NI + NCC + [Int \times (1 - \text{tax rate})] - FCInv - WCInv$$

where:

NI = net income

NCC = non cash charges (e.g., depreciation and change in deferred taxes)

Int = interest expense

FCInv = fixed capital investment (capital expenditures)

WCInv = working capital investment

- Step 4:** Discount free cash flows back to the present at the appropriate discount rate. Usually, this discount rate is simply the target's weighted average cost of capital (WACC), but in the context of evaluating a potential merger target, we want to adjust the target's WACC to reflect any changes in the target's risk or capital structure that may result from the merger ( $WACC_{\text{adjusted}}$ ).
- Step 5:** Determine the terminal value and discount it back to the present. The terminal value can be determined in two ways. The first is to use a constant growth model that assumes the company grows in perpetuity at a constant rate. The constant growth formula can be used when the terminal growth rate is less than the discount rate:

$$\text{terminal value}_T = \frac{FCF_T (1 + g)}{(WACC_{\text{adjusted}} - g)}$$

The second method applies a market multiple that the analyst believes that the firm will trade at the end of the first stage (e.g., a projected price/free cash flow ratio):

$$\text{terminal value}_T = FCF_T \times (P/FCF)$$

- Step 6:** Add the discounted FCF values for the first stage and the terminal value to determine the value of the target firm.



*Professor's Note: In a corporate finance problem, you may see the term enterprise value (EV) used to describe the sum of the FCF values for the first stage and the terminal value. EV is discussed later in this topic review, as well as in Study Session 12.*

**Example: Valuing a merger target using discounted cash flow analysis**

Goliath Manufacturing is considering acquiring Slingshot Systems, a software development company. Goliath's analysts have determined that a two-stage FCFE model is appropriate for their analysis, and have developed the pro forma income statement and other financial data shown in the follow table. Calculate Slingshot's free cash flows and estimate Slingshot's value as of January 2007 using DCF analysis. The WACC for Slingshot is 9.75%. If the merger is completed, Goliath plans to add debt to the capital structure that reduces the post-merger weighted average cost of capital, thus making the appropriate discount rate 9.50%.

**Pro Forma Income Statement and Other Financial Data for Slingshot Systems**

<i>Income Statement (in thousands)</i>	<i>2007</i>	<i>2008</i>	<i>2009</i>	<i>2010</i>	<i>2011</i>
Revenues	\$12,000	\$12,960	\$14,126	\$15,397	\$16,783
Cost of Goods Sold	<u>7,200</u>	<u>7,776</u>	<u>8,475</u>	<u>9,238</u>	<u>10,069</u>
Gross Profit	4,800	5,184	5,651	6,159	6,714
Selling, general and administrative	1,344	1,452	1,582	1,725	1,880
Depreciation	<u>420</u>	<u>454</u>	<u>494</u>	<u>539</u>	<u>587</u>
Earnings before interest and taxes (EBIT)	3,036	3,279	3,574	3,896	4,247
Net interest expense	<u>556</u>	<u>528</u>	<u>502</u>	<u>477</u>	<u>453</u>
Earnings before taxes (EBT)	2,480	2,751	3,072	3,419	3,794
Income tax	<u>868</u>	<u>963</u>	<u>1,075</u>	<u>1,197</u>	<u>1,328</u>
Net income	1,612	1,788	1,997	2,222	2,466
<i>Other Financial Data</i>					
Change in net working capital	\$384	\$415	\$452	\$493	\$537
Change in deferred taxes	\$17	\$19	\$22	\$25	\$27
Capital expenditures	\$1,104	\$1,192	\$1,300	\$1,417	\$1,544
		Tax rate	= 35.0%		
		WACC	= 9.75%		
		WACC <sub>adjusted</sub>	= 9.50%		
		Terminal growth rate	= 6.00%		

**Answer:**

Steps 1 and 2 are complete. We are using a two-stage FCF model and have computed the pro forma financials.

Step 3: Calculate free cash flows using the pro forma data.

Free Cash Flow for Slingshot Systems	2007	2008	2009	2010	2011
Net income	\$1,612	\$1,788	\$1,997	\$2,222	\$2,466
Add: Net interest after tax	361	343	326	310	294
Unlevered net income	1,973	2,131	2,323	2,532	2,760
Add: Change in deferred taxes	17	19	22	25	27
NOPLAT	1,990	2,150	2,345	2,557	2,787
Add: Depreciation	420	454	494	539	587
Subtract: Change in net working capital	384	415	452	493	537
Subtract: Capital expenditures	1,104	1,192	1,300	1,417	1,544
Free cash flow	\$922	\$997	\$1,087	\$1,186	\$1,293

*Professor's Note: Using the formula from Study Session 12, the calculations are as follows:*

$$FCFF = NI + NCC + [Int \times (1 - \text{tax rate})] - FCInv - WCInv$$

$$2007 \text{ FCFF} = \$1,612 + 420 + 17 + [556 \times (1 - 0.35)] - 1,104 - 384 = \$922$$



$$2008 \text{ FCFF} = \$1,788 + 454 + 19 + [528 \times (1 - 0.35)] - 1,192 - 415 = \$997$$

$$2009 \text{ FCFF} = \$1,997 + 494 + 22 + [502 \times (1 - 0.35)] - 1,300 - 452 = \$1,087$$

$$2010 \text{ FCFF} = \$2,222 + 539 + 25 + [477 \times (1 - 0.35)] - 1,417 - 493 = \$1,186$$

$$2011 \text{ FCFF} = \$2,466 + 587 + 27 + [453 \times (1 - 0.35)] - 1,544 - 537 = \$1,293$$

Step 4: Discount free cash flows back to the present at the appropriate discount rate.

We discount the FCFs for the first five years at the adjusted WACC of 9.50%.

$$\text{discounted FCF} = \frac{\$922}{1.095} + \frac{\$997}{1.095^2} + \frac{\$1,087}{1.095^3} + \frac{\$1,186}{1.095^4} + \frac{\$1,293}{1.095^5} = \$4,148$$

*Step 5: Determine the terminal value and discount it back to the present.*

To calculate the terminal value, we assume that Slingshot's future free cash flows will grow in perpetuity at a constant rate of 6%.

$$\text{terminal value}_5 = \frac{\text{FCF}_5(1+g)}{(\text{WACC}_{\text{adjusted}} - g)} = \frac{\$1,293(1+0.06)}{(0.095 - 0.06)} = \$39,159$$

$$\text{terminal value}_0 = \frac{\$39,159}{1.095^5} = \$24,875$$

*Step 6: Add the discounted FCF values for the first stage and the terminal value to determine the value of the target firm.*

Adding the present value of the free cash flows and the terminal value gives our estimated value for the target (as of January 2007).

$$\text{target value} = \$4,148 + \$24,875 = \$29,023 = \$29.023 \text{ million.}$$

### LOS 33.k: Estimate the intrinsic value of a company using comparable company analysis and comparable transaction analysis.

Comparable company analysis uses relative valuation metrics for similar firms to estimate market value and then adds a takeover premium to determine a *fair price* for the acquirer to pay for the target.



*Professor's Note: A variation of this approach applied to valuing the stocks in the S&P 500 is illustrated in Study Session 12.*

Comparable company analysis involves the following steps:

- Step 1: Identify the set of comparable firms.* Comparable company analysis involves identifying a set of other companies that are similar to the target firm. Ideally, the sample of other companies will come from the same industry as the target and have a similar size and capital structure.
- Step 2: Calculate various relative value measures based on the current market prices of companies in the sample.* Some analysts use relative value measures based on enterprise value (EV), which is the market value of the firm's debt and equity minus the value of cash and investments. These include EV to free cash flow, EV to EBITDA, and EV to sales. Other relative value measures use equity multiples such as price to earnings (P/E), price to book (P/B), and price to sales (P/S). Depending on what industry the target firm is in, some industry specific multiples may also be appropriate.

*Step 3: Calculate descriptive statistics for the relative value metrics and apply those measures to the target firm.* Analysts will typically calculate the mean, median, and range for the chosen relative value measures and apply those to the estimates for the target to determine the target's value. Value is equal to the multiple times the appropriate variable; for example, using the P/E ratio:

$$\text{value} = \text{EPS} \times (\text{P/E})$$

Ideally, the different relative value measures will produce similar estimates for the target's value in order to give the analyst confidence in the valuation estimate. If the valuation estimates are significantly different when using different metrics, the analyst will have to make a judgment about which estimates are most accurate.

*Step 4: Estimate a takeover premium.* A takeover premium is the amount that the takeover price of each of the target's shares must exceed the market price in order to persuade the target shareholders to approve the merger deal. This premium is usually expressed as a percentage of the target's stock price and is calculated as:

$$\text{TP} = \frac{\text{DP} - \text{SP}}{\text{SP}}$$

where:

TP = takeover premium

DP = deal price per share

SP = target company's stock price

To estimate an appropriate takeover premium, analysts usually look at premiums paid in recent takeovers of companies most similar to the target firm. SP should be the price of the target stock before any market speculation causes the target's stock price to jump; this typically occurs during the early stages of the process when the target company is first identified by the market as being a potential takeover opportunity.

*Step 5: Calculate the estimated takeover price for the target as the sum of estimated stock value based on comparables and the takeover premium.* The estimated takeover price is considered a *fair price* to pay for control of the target company. Once the takeover price is computed, the acquirer should compare it to the estimated synergies from the merger to make sure the price makes economic sense.

**Example: Valuing a merger target using comparable company analysis**

Mia Yost, an investment banker, has been retained by the Gracico Corporation to estimate the price that should be paid to acquire Albert Garage Systems, Inc. (AGSI). Yost decides to use comparable company analysis to value AGSI and has gathered information on comparable firms and recent acquisitions shown in the following figures to help with her analysis. Calculate the appropriate valuation metrics and using the mean of those metrics, estimate the price that Gracico should pay for AGSI.

**Comparable Company Data**

<i>Company Statistics</i>	<i>AGSI</i>	<i>Comparable Firm 1</i>	<i>Comparable Firm 2</i>	<i>Comparable Firm 3</i>
Current stock price		\$25.00	\$33.00	\$19.00
Earnings per share (EPS) (\$)	2.95	1.50	2.25	1.20
Book value per share (\$)	15.20	8.80	10.50	6.00
Cash flow per share (\$)	3.80	2.00	2.90	1.80
Sales per share (\$)	46.00	21.60	28.70	19.50

**Takeover Prices in Recent M&A Transactions**

<i>Target Company</i>	<i>Stock Price Prior to Takeover</i>	<i>Takeover Price</i>
Target 1	\$22.00	\$27.25
Target 2	\$18.25	\$21.00
Target 3	\$108.90	\$130.00
Target 4	\$48.50	\$57.00

**Answer:**

*Step 1: Identify the set of comparable firms.*

We can check off Step 1 as complete with the first table “Comparable Company Data.”

*Step 2: Calculate various relative value measures based on the current market prices of companies in the sample.*

Using the data from the table “Comparable Company Data,” the appropriate relative value measures for each firm are calculated in the following table.

Relative Value Measures for Comparable Firms				
Relative Value Measure	Comparable Firm 1	Comparable Firm 2	Comparable Firm 3	
Current stock price	\$25.00	\$33.00	\$19.00	
P/E	\$25 / 1.50 = 16.67	\$33 / 2.25 = 14.67	\$19 / 1.20 = 15.83	
P/B	\$25 / 8.80 = 2.84	\$33 / 10.50 = 3.14	\$19 / 6.00 = 3.17	
P/CF	\$25 / 2.00 = 12.50	\$33 / 2.90 = 11.38	\$19 / 1.80 = 10.56	
P/Sales	\$25 / 21.60 = 1.16	\$33 / 28.70 = 1.15	\$19 / 19.50 = 0.97	
Step 3: Calculate descriptive statistics for the relative value metrics and apply those measures to the target firm.				
The following figure shows the calculation for the average for each of the four valuation metrics.				
Mean Relative Value Measures				
Relative Value Measure	Firm 1 (a)	Firm 2 (b)	Firm 3 (c)	Mean (average) Relative Value Measure (a + b + c) / 3
P/E	16.67	14.67	15.83	15.72
P/B	2.84	3.14	3.17	3.05
P/CF	12.50	11.38	10.56	11.48
P/Sales	1.16	1.15	0.97	1.09
The next figure applies these mean values to the statistics for AGSI. Since the four relative value metrics all produce estimates that are relatively close, it is appropriate to use an average of the four estimates as the estimated value for AGSI.				
Estimated Stock Value for AGSI				
Target Company Statistics	AGSI Statistics (a)	Relative Value Measure	Mean Relative Value Measure (b)	Estimated Stock Value Based on Comparables (a × b)
Earnings per share (EPS) (\$)	2.95	P/E	15.72	\$46.37
Book value per share (\$)	15.20	P/B	3.05	\$46.36
Cash flow per share (\$)	3.80	P/CF	11.48	\$43.62
Sales per share (\$)	46.00	P/Sales	1.09	\$50.14
Mean Estimated Stock Value: = \$46.62				

*Step 4: Estimate a takeover premium.*

The takeover premium is calculated for recent deals most similar to Gracico's proposed acquisition of AGSI. Since the four takeover premiums are relatively close, it is appropriate to use an average of the four estimates to apply to AGSI.

#### Calculation of Takeover Premium

<i>Target Company</i>	<i>Target Stock Price Prior to Takeover (a)</i>	<i>Deal Price (b)</i>	<i>Takeover Premium [(b) – (a)] / (a)</i>
Target 1	\$22.00	\$27.25	23.9%
Target 2	\$18.25	\$21.00	15.1%
Target 3	\$108.90	\$130.00	19.4%
Target 4	\$48.50	\$57.00	17.5%
			<b>Mean premium: 19.0%</b>

*Step 5: Calculate the estimated takeover price for the target as the sum of estimated stock value based on comparables and the takeover premium.*

Estimated stock value based on comparable firms: \$46.62

Estimated takeover premium: 19.0%

Estimated takeover price for AGSI =  $\$46.62 \times 1.19 = \$55.48$

## ESTIMATING THE VALUE OF A MERGER TARGET USING COMPARABLE TRANSACTION ANALYSIS

Comparable transaction analysis uses details from recent takeover transactions of similar companies to estimate the target's takeover value. The methodology behind the approach is very similar to the comparable company approach we just showed you, except that all of the comparables are firms that have recently been taken over. The biggest challenge is finding enough relevant takeover transactions for firms that are similar to the target being analyzed. However, using recent transaction data means that the takeover premium is already included in the price, so there is no need to calculate it separately. Comparable transaction analysis involves the following steps:

- Step 1: Identify a set of recent takeover transactions.* Ideally, all of the takeovers will involve firms in the same industry as the target and have a similar capital structure. These sorts of deals can be difficult to find, so the analyst will have to use some judgment as to what recent merger deals are most applicable to the analysis.
- Step 2: Calculate various relative value measures based on completed deal prices for the companies in the sample.* The measures used here are the same as those used in comparable company analysis (e.g., P/E, P/CF), but they are based on prices for completed M&A deals rather than current market prices.



*Step 3: Calculate descriptive statistics for the relative value metrics and apply those measures to the target firm.* Again, analysts will typically calculate the mean, median, and range for the chosen relative value measures and apply those to the firm statistics for the target to determine the target's value.

#### Example: Valuing a merger target using comparable transaction analysis

Ken Lloyd, an investment banker, has been retained by the Gase Equipment Company to estimate a fair price for the proposed acquisition of the Peerless Saw Company. Lloyd decides to use comparable transaction analysis to value Peerless and has gathered information concerning recent M&A transactions in the industrial equipment industry, which is shown in the following figure. Calculate the appropriate valuation metrics and using the mean of those metrics, and estimate the price that Gase Equipment should pay for the Peerless Saw Company.

#### Comparable Transaction Data

<i>Company Statistics</i>	<i>Peerless Saw</i>	<i>Acquired Company 1</i>	<i>Acquired Company 2</i>	<i>Acquired Company 3</i>
Deal price per share (\$)		\$42.00	\$21.50	\$90.00
Earnings per share (EPS) (\$)	3.25	1.80	0.85	4.65
Book value per share (\$)	18.50	9.75	5.25	22.25
Cash flow per share (\$)	4.10	2.10	1.10	5.05
Sales per share (\$)	33.00	18.20	9.75	38.90

#### Answer:

*Step 1: Identify a set of recent takeover transactions.*

Recent takeover transactions in the industrial equipment industry are shown in the preceding figure.

*Step 2: Calculate various relative value measures based on completed deal prices for the companies in the sample.*

The relative value measures are computed by dividing the deal price for each acquired company by the appropriate valuation statistic from the following figure.

#### Relative Value Measures Based on Completed Deal Prices

<i>Relative Value Measure</i>	<i>Acquired Company 1</i>	<i>Acquired Company 2</i>	<i>Acquired Company 3</i>
P/E	23.33	25.29	19.35
P/B	4.31	4.10	4.04
P/CF	20.00	19.55	17.82
P/Sales	2.31	2.21	2.31

*Step 3: Calculate descriptive statistics for the relative value metrics and apply those measures to the target firm.*

The following figure shows the calculation for the arithmetic mean for each of the four valuation metrics.

#### Mean Relative Value Measures

<i>Relative Value Measure</i>	<i>Acquired Company 1 (a)</i>	<i>Acquired Company 2 (b)</i>	<i>Acquired Company 3 (c)</i>	<i>Mean (average) Relative Value Measure (a + b + c) / 3</i>
P/E Ratio	23.33	25.29	19.35	22.66
P/B Ratio	4.31	4.10	4.04	4.15
P/CF Ratio	20.00	19.55	17.82	19.12
P/Sales Ratio	2.31	2.21	2.31	2.28

The next figure applies those mean values to the statistics for Peerless Saw. Since the four relative value metrics all produce estimates that are relatively close, it is appropriate to use an average of the four estimates as the estimated value for Peerless Saw.

#### Estimated Target Value for Peerless Saw Company

<i>Target Company Statistics</i>	<i>Peerless Saw Company Statistics (a)</i>	<i>Relative Value Measure</i>	<i>Mean Relative Value Measure (b)</i>	<i>Estimated Stock Value Based on Comparables (a × b)</i>
Earnings per share (EPS) (\$)	3.25	P/E	22.66	\$73.65
Book value per share (\$)	18.50	P/B	4.15	\$76.78
Cash flow per share (\$)	4.10	P/CF	19.12	\$78.39
Sales per share (\$)	33.00	P/Sales	2.28	\$75.24
<b>Mean Estimated Target Value: = \$76.02</b>				

The estimated target value of \$76.02 is considered a *fair price* to pay for control of Peerless Saw. Note that since we used deal prices from actual M&A transactions as the basis for our analysis, there is no need to calculate a separate transaction premium because it is already incorporated into the price.

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**LOS 33.i: Compare and contrast the three major methods for valuing a target company, including the advantages and disadvantages of each.**

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**Discounted cash flow analysis** is based on a pro forma forecast of the target firm's expected future free cash flows, discounted back to the present.

*Advantages:*

- It is relatively easy to model any changes in the target company's cash flow resulting from operating synergies or changes in cost structure that may occur after the merger.
- The estimate of company value is based on forecasts of fundamental conditions in the future rather than on current data.
- The model is easy to customize.

*Disadvantages:*

- The model is difficult to apply when free cash flows are negative. For example, a target company experiencing rapid growth may have negative free cash flows due to large capital expenditures.
- Estimates of cash flows and earnings are highly subject to error, especially when those estimates are for time periods far in the future.
- Discount rate changes over time can have a large impact on the valuation estimate.
- Estimation error is a major concern since the majority of the estimated value for the target is based on the terminal value, which is highly sensitive to estimates used for the constant growth rate and discount rate.

**Comparable company analysis** uses market data from similar firms plus a takeover premium to derive an estimated value for the target.

*Advantages:*

- Data for comparable companies is easy to access.
- Assumption that similar assets should have similar values is fundamentally sound.
- Estimates of value are derived directly from the market rather than assumptions and estimates about the future.

*Disadvantages:*

- The approach implicitly assumes that the market's valuation of the comparable companies is accurate.
- Using comparable companies provides an estimate of a fair stock price, but not a fair takeover price. An appropriate takeover premium must be determined separately.
- It is difficult to incorporate merger synergies or changing capital structures into the analysis.
- Historical data used to estimate a takeover premium may not be timely, and therefore may not reflect current conditions in the M&A market.

**Comparable transaction analysis** uses details from completed M&A deals for companies similar to the target being analyzed to calculate an estimated value for the target.

*Advantages:*

- Since the approach uses data from actual transactions, there is no need to estimate a separate takeover premium.

- Estimates of value are derived directly from recent prices for actual deals completed in the marketplace rather than from assumptions and estimates about the future.
- Use of prices established by recent transactions reduces the risk that the target's shareholders could file a lawsuit against the target's managers and board of directors for mispricing the deal.

*Disadvantages:*

- The approach implicitly assumes that the M&A market valued past transactions accurately. If past transactions were over or underpriced, the mispricings will be carried over to the estimated value for the target.
- There may not be enough comparable transactions to develop a reliable data set for use in calculating the estimated target value. If the analyst isn't able to find enough similar companies, she may try to use M&A deals from other industries that are not similar enough to the deal being considered.
- It is difficult to incorporate merger synergies or changing capital structures into the analysis.

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**LOS 33.1: Evaluate a merger bid, calculate the estimated post-merger value of an acquirer, and calculate the gains accrued to the target shareholders versus the acquirer shareholders.**

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### Post-Merger Value of an Acquirer

In any merger that makes economic sense, the combined firm will be worth more than the sum of the two separate firms. This difference is the *gain*, which is a function of synergies created by the merger and any cash paid to shareholders as part of the transaction.

In equation form, we can denote the post-merger value of the combined company as:

$$V_{AT} = V_A + V_T + S - C$$

where:

$V_{AT}$  = post-merger value of the combined company (acquirer + target)

$V_A$  = pre-merger value of acquirer

$V_T$  = pre-merger value of target

$S$  = synergies created by the merger

$C$  = cash paid to target shareholders

Once again, remember that the pre-merger value of the target should be the price of the target stock before any market speculation causes the target's stock price to jump.

### Gains Accrued to the Target

In most merger transactions, acquirers must pay a takeover premium to entice the target's shareholders to approve the merger. The target company's management will try to negotiate the highest possible premium relative to the value target company. From the

target's perspective, the takeover premium is the amount of compensation received in excess of the pre-merger value of the target's shares, or:

$$\text{Gain}_T = \text{TP} = P_T - V_T$$

where:

$\text{Gain}_T$  = gains accrued to target shareholders

TP = takeover premium

$P_T$  = price paid for target

$V_T$  = pre-merger value of target

### Gains Accrued to the Acquirer

Acquirers are willing to pay a takeover premium because they expect to generate their own gains from any synergies created by the transaction. The acquirer's gain is therefore equal to the synergies received less the premium paid to the target's shareholders, or:

$$\text{Gain}_A = S - \text{TP} = S - (P_T - V_T)$$

where:

$\text{Gain}_A$  = gains accrued to the acquirer shareholders

Note that in a cash deal the cash paid to the target shareholders ( $C$ ) is equal to the price paid for the target ( $P_T$ ).



*Professor's Note: The gains for the acquirer and the gains for the target leave us with  $S$ , or the synergies from the deal. It's the gain resulting from the estimated value of cost reduction synergies or revenue enhancement synergies that acquirer and the target are dividing.*

### Cash Payment Versus Stock Payment

In addition to the price paid, the ultimate gain to the acquirer or the target is also affected by the choice of payment method. Mergers can be either financed through cash or through an exchange of shares of the combined firm. The chosen payment method typically reflects how confident both parties are about the estimated value of the synergies resulting from the merger. This is because different methods of payment will give the acquirer and the target different risk exposures with respect to misestimating the value of synergies.

Let's think about the intuition before we go through any examples. With a cash offer, the target firm's shareholders will profit by the amount paid over its current share price (e.g., the takeover premium). However, this gain is capped at that amount.

With a stock offer, the gains will be determined in part by the value of the combined firm, because the target firm's shareholders do not receive cash and just walk away, but rather retain ownership in the new firm. Accordingly, for a stock deal we must adjust our formula for the price of the target:

$$P_T = (N \times P_{AT})$$

where:

$N$  = number of new shares the target receives

$P_{AT}$  = price per share of combined firm after the merger announcement



*Professor's Note: Note the use of  $P_{AT}$  (market price of AT) and not  $V_{AT}$  (value of AT in the formula).*

### Example: Evaluating a merger bid

Giant Foods and Kazmaier's Grocery are negotiating a friendly acquisition of Kazmaier's by Giant Foods. The management teams at both companies have tentatively agreed upon a transaction value of about \$27 per share for Kazmaier's stock, but are presently negotiating alternative methods of payment. Jennifer Nagy, CFA, works for Kozlowski Inc, the investment banking firm representing Giant Foods. Nagy has compiled the data in the following figure to analyze the transaction.

#### Merger Evaluation Inputs

	<i>Giant Foods</i>	<i>Kazmaier's Grocery</i>
Pre-merger stock price	\$36	\$24
Number of shares outstanding (millions)	50	24
Pre-merger market value (millions)	\$1,800	\$576
Estimated NPV of cost reduction synergies	\$120 million	

Calculate the post-merger value of the combined firm, gains accrued to the target, and gains accrued to the acquirer under the following scenarios:

- Case 1: Cash offer of \$27 per share for Kazmaier's stock.
- Case 2: Stock offer of 0.75 shares of Giant Foods stock per share of Kazmaiers.

#### Answer Case 1 – Cash Offer:

A cash offer is the method of payment that is most straight-forward and easiest to evaluate.

*Post merger value of the combined firm:*  $V_{AT} = V_A + V_T + S - C$

$$V_A = \$1,800$$

$$V_T = \$576$$

$$S = \$120$$

$$C = \text{cash price offered} \times \text{number of shares} = \$27 \times 24 = \$648$$

The value of the combined firm is  $V_{AT} = \$1,800 + \$576 + \$120 - \$648 = \$1,848$ .

*Gain to target:* Kazmaier's gain in the merger as the target =  $\text{Gain}_T = TP = P_T - V_T = \$648 - \$576 = \$72$ . This represents the takeover premium in the transaction.

*Gain to acquirer:* Giant Foods' gain in the merger as the acquirer =  $P_T = S - (P_T - V_T) = \$120 - (\$648 - \$576) = \$48$ . This equals the value of synergies in the deal less the takeover premium paid to Kazmaier's shareholders.

**Answer Case 2 – Stock Offer:**

A stock offer is much more complex and more difficult to evaluate. In this case, the stock offer of 0.75 shares for each share of Kazmaier's is equal to  $(0.75 \times \$36) = \$27$ , so it appears to be equivalent to the cash offer. However, the results are different because there is dilution when Giant Foods issues new stock to Kazmaier's shareholders. Since there are 24 million shares of Kazmaier's outstanding, Giant Foods must issue  $24 \text{ million} \times 0.75 = 18 \text{ million}$  new shares.

*Post merger value of the combined firm:*  $V_{AT} = V_A + V_T + S - C$

$$V_A = \$1,800$$

$$V_T = \$576$$

$$S = \$120$$

$$C = \$0 \text{ because no cash is changing hands}$$

The value of the combined firm is  $V_{AT} = \$1,800 + \$576 + \$120 - 0 = \$2,496$ .

*Gain to target:* To account for the dilution and find the price per share for the combined firm,  $P_{AT}$  divide the post-merger value by the post-merger number of shares outstanding. Since 18 million new shares were issued, the total shares outstanding for Giant Foods is  $(50 + 18) = 68 \text{ million}$ .

$$P_{AT} = \frac{\$2,496}{68} = \$36.70$$

This means the actual value of each share given to Kazmaier's shareholders is \$36.70, and the actual price paid for the target is:

$$P_T = (N \times P_{AT}) = (18 \times \$36.70) = \$660.60$$

Kazmaier's gain in the merger as the target is:

$$\text{Gain}_T = TP = P_T - V_T = \$660.60 - \$576 = \$84.60$$

This represents the takeover premium in the transaction.

*Gain to acquirer:* Giant Foods' gain in the merger as the acquirer is:

$$\text{Gain}_A = S - TP = S - (P_T - V_T) = \$120 - (\$660.60 - \$576) = \$35.4 \text{ million}$$

This equals the value of synergies in the deal less the takeover premium paid to Kazmaier's shareholders.

The examples show that the gain to Giant Foods' shareholders was \$48 million in the all cash deal, but only \$35.4 million in the stock deal. The dilution from the stock offer effectively reduced the acquirer's gains because the target was able to share in the risk and reward of the deal as a result of receiving shares.

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**LOS 33.m: Explain the effects of price and payment method on the distribution of risks and benefits in a merger transaction.**


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**Effect of Price**

With any merger deal, the acquirer and the target are on opposite sides of the table because both parties want to extract as much value as possible for themselves out of the deal. This means that the *acquirer will want to pay the lowest possible price* (the pre-merger value of the target,  $V_T$ ), while the *target wants to receive the highest possible price* (the pre-merger value of the target plus the expected synergies,  $V_T + S$ ).

**Effect of Payment Method**

**Cash offer.** In a cash offer, the acquirer assumes the risk and receives the potential reward from the merger, while the gain for the target shareholders is limited to the takeover premium. If an acquirer makes a cash offer in a deal, but the synergies realized are greater than expected, the takeover premium for the target would remain unchanged while the acquirer reaps the additional reward. Likewise, if synergies were less than expected, the target would still receive the same takeover premium, but the acquirer's gain may evaporate.

**Stock offer.** In a stock offer, some of the risks and potential rewards from the merger shift to the target firm. When the target receives stock as payment, the target's shareholders become a part owner of the acquiring company. This means that if estimates of the potential synergies are wrong, the target will share in the upside if the actual synergies exceed expectations, but will also share in the downside if the actual synergies are below expectations.

The main factor that affects the method of payment decision is confidence in the estimate of merger synergies. The more confident both parties are that synergies will be realized, the more the acquirer will prefer to pay cash and the more the target will prefer to receive stock. Conversely, if estimates of synergies are uncertain, the acquirer may be willing to shift some of the risk (and potential reward) to the target by paying for the merger with stock, but the target may prefer the guaranteed gain that comes from a cash deal.

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**LOS 33.n: Describe the empirical evidence related to the distribution of benefits in a merger.**


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Short-term performance studies that look at stock returns before and after merger announcement dates conclude that targets gain approximately 30%, while acquirers lose stock value of between 1% and 3%.<sup>1</sup> Some believe that the high premiums received by target firms are the result of acquiring firms suffering from a *winner's curse*, in which the competitive bidding process is won by the firm who overpays the most. Managers also

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1. J. Fred Weston and Samuel C. Weaver, *Mergers & Acquisitions* (New York: McGraw-Hill, 2001), pp. 93-116.



may overestimate the synergies and expected benefits of the merger. This tendency is called *managerial hubris*.

Longer term performance studies of post-merger companies show that acquirers tend to underperform their peers. Average returns for acquirers three years after a merger are –4% with over 60% of acquiring firms lagging their peer group.<sup>2</sup> Some believe that these results are due to a failure to capture promised synergies after a merger is completed.

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### LOS 33.o: Compare and contrast divestitures, equity carve-outs, spin-offs, split-offs, and liquidation.

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In this section, we discuss ways a firm can reduce its size. Divestitures, equity carve-outs, spin-offs, split-offs, and liquidation are all methods by which a firm separates a portion of its operations from the parent company.

**Divestitures** refer to a company selling, liquidating, or spinning off a division or subsidiary. Most divestitures involve a direct sale of a portion of a firm to an outside buyer. The selling firm is typically paid in cash and gives up control of the portion of the firm sold.



*Professor's Note: Divestiture is often used as a generic term for a disposing of assets, so a carve-out, spin-off, or liquidation may also be considered a divestiture.*

**Equity carve-outs** create a new, independent company by giving an equity interest in a subsidiary to outside shareholders. Shares of the subsidiary are issued in a public offering of stock, and the subsidiary becomes a new legal entity whose management team and operations are separate from the parent company.

**Spin-offs** are like carve-outs in that they create a new independent company that is distinct from the parent company. The primary difference is that shares are not issued to the public, but are instead distributed proportionately to the parent company's shareholders. This means that the shareholder base of the spin-off will be the same as that of the parent company, but the management team and operations are completely separate. Since shares of the new company are simply distributed to existing shareholders, the parent company does not receive any cash in the transaction.

**Split-offs** allow shareholders to receive new shares of a division of the parent company *in exchange* for a portion of their shares in the parent company. The key here is that shareholders are giving up a portion of their ownership in the parent company to receive the new shares of stock in the division.

**Liquidations** break up the firm and sell its asset piece by piece. Most liquidations are associated with bankruptcy.

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2. T. Koller, M. Goedhart, and D. Wessels, *Valuation: Measuring and Managing the Value of Companies*, 4<sup>th</sup> ed. (Hoboken, NJ: John Wiley and Sons, 2005), p. 439, footnotes 3 and 4.

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**LOS 33.p: Discuss the major reasons for divestitures.**

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*Division no longer fits into management's long-term strategy.* The parent may feel that it will be unable to make a profit with a particular division, or that the division is no longer a strategic fit with the long-term direction of the company. In this case, to focus on its core business, the parent can sell the assets to another firm that can utilize the assets more effectively.

*Lack of profitability.* The return on a division could be less than the firm's cost of capital, causing economic losses for the company. A poorly performing division could be caused by management making a bad choice to enter the division in the first place, or because the attractiveness of the division declines over time due to rising cost structures or changing consumer tastes.

*Individual parts are worth more than the whole.* One of major reasons cited for M&A deals is *synergy*, which is the concept that a combined entity is worth more than the sum of the parts. In the same line of thinking, *reverse synergy*, the concept that the individual parts are worth more than the whole, is a common justification for divestitures. A parent company may decide that it can unlock more value from a division by selling it to an outside bidder rather than keeping it.

*Infusion of cash.* Selling a division can create a significant cash inflow for the parent company. If the parent company is experiencing financing difficulty, selling a division can be a quick way to raise cash and reduce debt.

## KEY CONCEPTS

### LOS 33.a

Mergers can be classified according to the form of acquisition.

- In a statutory merger, the target ceases to exist and all assets and liabilities become part of the acquirer.
- In a subsidiary merger, the target company becomes a subsidiary of the acquirer.
- With consolidations, both companies cease to exist in their prior form and come together to form a new company.

Mergers can also be classified by type:

- Horizontal mergers, where firms in similar lines of business combine.
- Vertical mergers, which combine firms either further up or down the supply chain.
- Conglomerate mergers, which combine firms in unrelated businesses.

### LOS 33.b

Common motivations behind M&A activity include achieving synergies, more rapid growth, increasing market power, gaining access to unique capabilities, diversification, personal benefits for managers, tax benefits, unlocking hidden value for a struggling company, achieving international business goals, and bootstrapping earnings.

### LOS 33.c

Bootstrapping is a technique whereby a high P/E firm acquires a low P/E firm in an exchange of stock. The total earnings of the combined firm are unchanged, but the total shares outstanding are less than the two separate entities. The result is higher reported earnings per share, even though there may be no economic gains.

### LOS 33.d

Companies tend to focus on different motivations for mergers depending on what stage of the industry life cycle they are in.

- In the pioneer and rapid growth phases, companies look to mergers to provide additional capital or capacity for growth; conglomerate and horizontal mergers are common.
- In the mature growth and stabilization phases, firms are looking for synergies to reduce costs; horizontal and vertical mergers are common.
- In the decline phase companies are typically looking for new growth opportunities to survive; all three merger types are common.

### LOS 33.e

A merger transaction may take the form of a stock purchase or an asset purchase.

- In a stock purchase, the target's shareholders receive cash or shares of the acquiring company's stock in exchange for their shares of the target.
- In an asset purchase, payment is made directly to the target company in return for specific assets.

The method of payment in a merger transaction may be cash, stock, or a combination of the two. Cash offerings are straight forward, but in a stock offering, the exchange ratio determines the number of the acquirer's shares that each target company shareholder will receive.

**LOS 33.e (continued)**

The target company's management will either view a merger as being friendly or hostile.

- In a friendly merger, the acquirer and target work together to perform due diligence and sign a definitive merger agreement before submitting the merger proposal to the target's shareholders.
- In a hostile merger, the acquirer seeks to avoid the target's management through a tender offer or proxy battle.

**LOS 33.f**

Pre-offer defense mechanisms to avoid a hostile takeover include poison pills, poison puts, reincorporating in a state with restrictive takeover laws, staggered board elections, restricted voting rights, supermajority voting, fair price amendments, and golden parachutes.

Post-offer defense mechanisms to avoid a hostile takeover include the "just say no" defense, litigation, greenmail, share repurchases, leveraged recapitalizations, the crown jewel defense, the Pac man defense, and finding a white knight or white squire.

**LOS 33.g**

Antitrust laws are designed to stop mergers and acquisitions that may hinder healthy competition in the marketplace. Major U.S. antitrust legislation includes The Sherman Antitrust Act, The Clayton Antitrust Act, the Celler-Kefauver Act, and the Hart-Scott-Rodino Improvements Act.

**LOS 33.h**

The Herfindahl-Hirschman Index (HHI) measures market power based on the sum of the squared market shares for all firms within an industry. High or increasing HHI values means that regulators are more likely to challenge a merger based on anti-trust grounds.

**LOS 33.i**

The three basic methods for determining the value of a target in an M&A transaction are:

- Discounted cash flow method.
- Comparable company analysis.
- Comparable transaction analysis.

Discounted cash flow analysis

*Advantages:*

- Easy to model changes in cash flow from synergies or changes in cost structure.
- Based on forecasts of fundamental conditions.
- Easy to customize.

*Disadvantages:*

- Difficult with negative FCF.
- Estimates highly subject to error, especially for the distant future.
- Discount rate changes over time can have a large impact on the estimate.
- Heavily dependent on terminal value, growth rate, and discount rate.

**LOS 33.i (continued)**

Comparable company analysis

*Advantages:*

- Data for comparable companies is easy to access.
- Fundamental valuation assumptions are sound.
- Current market-based estimates of value, not guesses about the future.

*Disadvantages:*

- Assumes the market's valuation of the comparable companies is accurate.
- Estimate is a fair stock price, not a fair takeover price. An appropriate takeover premium must be determined separately.
- Difficult to include synergies or changing capital structures into the analysis.
- Historical data may not reflect current conditions in the M&A market.

Comparable transaction analysis

*Advantages:*

- Based on actual transactions: no need to estimate a takeover premium.
- Uses recent market prices from actual deals rather than assumptions and estimates about the future.
- Easily justified to target's shareholders, managers, and board.

*Disadvantages:*

- Assumes that the M&A market valued past transactions accurately; mispricings will be carried over to the estimated value for the target.
- Truly comparable transactions are rare. The analyst may be forced to use dissimilar M&A deals from other industries.
- Difficult to incorporate synergies or changing capital structures into the analysis.

**LOS 33.j**

The process for valuing a target company with discounted cash flow analysis requires the following steps:

- Determine which free cash flow model to use for the analysis.
- Develop pro forma financial estimates.
- Calculate free cash flows using the pro forma data.
- Discount free cash flows back to the present.
- Determine the terminal value and discount it back to the present.
- Add the discounted FCF values to the discounted terminal value.

**LOS 33.k**

The process for valuing a target company with comparable company analysis requires the following steps:

- Identify the set of comparable firms.
- Calculate various relative value measures based on the current market prices of companies in the sample.
- Calculate descriptive statistics for the relative value metrics and apply those measures to the target firm.
- Estimate a takeover premium.
- Calculate the estimated takeover price for the target as the sum of estimated stock value based on comparables and the takeover premium.

**LOS 33.k (continued)**

The process for valuing a target company with comparable transaction analysis requires the following steps:

- Identify a set of recent takeover transactions.
- Calculate various relative value measures based on completed deal prices for the companies in the sample.
- Calculate descriptive statistics for the relative value metrics and apply those measures to the target firm.

**LOS 33.l**

The value of the combined firm after a merger deal is a function of synergies created by the merger and any cash paid to shareholders as part of the transaction, or

$$V_{AT} = V_A + V_T + S - C.$$

In a merger transaction, target shareholders capture the takeover premium, which is the amount that the price paid exceeds the target's value:  $\text{Gain}_T = TP = P_T - V_T$ .

The acquirer in a merger transaction captures the value of any synergies created in the merger less the premium paid to the target, or  $\text{Gain}_A = S - TP = S - (P_T - V_T)$ .

**LOS 33.m**

In a cash offer, the acquirer assumes the risk and receives the potential reward from the merger synergies, but in a stock offer, some of the risks and potential rewards from the merger shift to the target firm.

**LOS 33.n**

Empirical evidence shows that targets receive the majority of benefits in a merger deal. In the years following a deal, acquirers tend to underperform their peers, which suggests that estimated synergies are not realized.

**LOS 33.o**

When a firm separates a portion of its operations from a parent company it is called a divestiture. Four common forms of divestitures include equity carve-outs, spin-offs, split-offs, and liquidations.

**LOS 33.p**

Reasons why a company may divest assets include:

- A division no longer fitting into management's strategy.
- Poor profitability for a division.
- Reverse synergy.
- To receive an infusion of cash.

## CONCEPT CHECKERS

1. Uritus Pharmaceuticals, a maker of flu vaccines and cancer drugs, is acquiring Troup Healthcare Systems, a distributor of branded and generic drugs to hospitals and retail customers. After the merger, a press release is made by the companies announcing that a new company called Sovereign Health is being formed from the assets of the combined companies. The form of integration and type of merger in this transaction would be *best* described as:
  - A. horizontal statutory merger.
  - B. vertical consolidation.
  - C. bilateral statutory consolidation.
2. The management team of Acme Machinery wants to acquire Viera Equipment. Which of the following is *least likely* to be a motivation for the merger?
  - A. Acme's management team believes that external growth will increase revenues faster than organic growth.
  - B. Acme has large accumulated tax losses on its balance sheet, which could offset gains at Viera.
  - C. Viera has struggled for a long period of time and Acme believes it can buy the company and change the organizational structure.
3. Bootstrapping occurs when a:
  - A. high P/E firm acquires a low P/E firm for cash.
  - B. low P/E firm acquires a high P/E firm for stock.
  - C. high P/E firm acquires a low P/E firm for stock.
4. Gusto Technologies, a semiconductor manufacturer with high profit margins, is seeking to merge with Hexelon, Inc., a maker of aerospace materials, in a conglomerate merger in order to gain access to Hexelon's large capital base. Gusto is *most likely* in the:
  - A. rapid growth stage.
  - B. mature growth stage.
  - C. stabilization stage.
5. Which of the following is a typical characteristic of an asset purchase of less than 50% of the target's assets?
  - A. Majority shareholder approval is typically required.
  - B. The target company is responsible for any capital gains taxes associated with the deal.
  - C. The acquirer takes on a portion of the target firm's liabilities.
6. Which of the following merger defense mechanisms is likely to receive the *most* scrutiny in court after a hostile takeover attempt?
  - A. Restricted voting rights.
  - B. Supermajority voting provisions.
  - C. Crown jewel defense.

7. Which of the following U.S. antitrust acts required all merger deals to be reviewed by the Federal Trade Commission in advance of the transaction?
- Hart-Scott-Rodino Act.
  - Clayton Antitrust Act.
  - Celler-Kefauver Act.
8. Spears Financial is seeking to merge with the Cyrus Capital Group, but the managers of Spears are concerned that regulators may consider the merger an antitrust violation. The market consists of nine competitors. The largest company has a 20% market share and the second largest company has an 18% market share. Spears Financial and Cyrus Capital Group are the third and fourth largest competitors with a 12% and 10% market share, respectively. The remaining five competitors each have an 8% market share. What would be the increase in the Herfindahl-Hirschman Index (HHI) as a result of the merger and the *most likely* reaction by regulators to the merger?
- | <u>Increase in the HHI</u> | <u>Probable response by regulators</u> |
|----------------------------|--|
| A. 60                      | No antitrust challenge                 |
| B. 240                     | Potential antitrust challenge          |
| C. 240                     | No antitrust challenge                 |
9. Naomi Hiraue and Michael Klinkenfus, financial analysts with Mintier Textiles, are discussing potential ways to value a target firm that Mintier is considering acquiring. As they are discussing which valuation method to use, Klinkenfus makes two statements:
- “One of the advantages to the DCF method is that it makes it easy to model changes in the target company’s cash flow resulting from changes in operating synergies that may occur after the merger.”
  - “Since the comparable transaction approach uses actual transaction data, there is no need to calculate a takeover premium.”
- How should Hiraue respond to Klinkenfus’s statements?
- Agree with both statements.
  - Disagree with both statements.
  - Agree with only one statement.
10. Andrew Barton is an intern with the Gilmore Capital Group. Barton’s supervisor, Barbara Clemens, asks him to compile information about academic studies concerning the distribution of benefits in a merger. After a week, Barton sends Clemens an e-mail with the following statements:
- “Studies show that immediately after a merger announcement, target firm shareholders gain approximately 30%, while acquirers’ stock prices tend to fall.”
  - “Longer term performance studies of post-merger companies show that they outperform their peers, indicating that merger synergies often exceed expectations.”
- Are Barton’s statements correct?
- Both statements are correct.
  - Neither statement is correct.
  - Only one statement is correct.



11. Vinova Corporation is seeking to acquire JJK Systems, Inc. The management teams of both JJK and Vinova feel confident that estimates of synergies resulting from the merger and the valuation of JJK are extremely precise. Given the confidence of both firms, which method of payment would each firm prefer in the merger?

<u>Vinova corporation</u>	<u>JJK Systems, Inc.</u>
A. Stock offer	Stock offer
B. Stock offer	Cash offer
C. Cash offer	Stock offer

12. Vona Whatley, an analyst for Discovery Electronics, is considering alternatives for divesting the company's personal computer (PC) business. Whatley believes that the PC industry offers a high degree of competition and few growth opportunities, so Whatley wants to explore Discovery's options for using the assets more efficiently. In a conversation with Marquis Stone, the CFO for Discovery, Whatley makes the following statements:

- "I think it would be best if we created a new, independent company out of the PC business and generate a cash infusion for our remaining core business by issuing shares of the new company in a public stock offering."
- "Another alternative would be to give current shareholders a choice of what business they want to own, and allow them to exchange shares of Discovery Electronics for shares in the new PC company."

Which forms of corporate restructuring *most closely* reflect Whatley's proposals to:

<u>Issue shares in an IPO?</u>	<u>Exchange shares?</u>
A. Carve-out	Split-off
B. Split-off	Split-off
C. Carve-out	Spin-off

13. Which of the following is *least likely* to be a reason for making a divestiture?
- Management feels that they would have greater access to capital markets as part of a more focused company.
  - A division is making significant profits as part of a high growth industry.
  - Management believes that the parts of a company are worth more individually than the company as a whole.

## CHALLENGE PROBLEMS

Use the following information to answer Questions 14 through 16.

Madura Publishing, a publisher of academic textbooks, has made an offer to acquire Dorman-Gladwell, a publisher of children's books. The management teams at both companies have tentatively agreed upon a transaction value of \$56 per share for Dorman-Gladwell, but are presently negotiating alternative methods of payment. Data used for the analysis of the transaction is given below.

	<i>Madura Publishing</i>	<i>Dorman-Gladwell</i>
Pre-merger stock price	\$80	\$48
Number of shares outstanding (millions)	30	20
Pre-merger market value (millions)	\$2,400	\$960

Once the merger is completed, Dominic Culp, the CEO of Madura Publishing, plans for Madura to take on all of Dorman-Gladwell's assets and liabilities, and the combined company will continue to operate under the Madura Publishing name. Culp estimates that cost reduction synergies as a result of the merger will total approximately \$180 million.

14. The form of integration and type of merger in this transaction would be *best* described as:
  - A. statutory vertical.
  - B. statutory horizontal.
  - C. subsidiary horizontal.
15. If the deal is completed as a cash transaction, the amount of the gain for Dorman-Gladwell's shareholders is *closest* to:
  - A. \$90 million.
  - B. \$112 million.
  - C. \$160 million.
16. If the deal is completed as a stock transaction with an exchange ratio of 0.7, the amount of the gain for Madura Publishing's shareholders is *closest* to:
  - A. \$9.6 million.
  - B. \$13.7 million.
  - C. \$20.0 million.

Use the following information to answer Questions 17 through 21.

Gretsch Industries is considering acquiring Flueger Systems. Although Flueger has said it is not for sale, Gretsch is considering a hostile takeover by making a tender offer directly to Flueger's shareholders. Meghan Doyle, a financial analyst with Gretsch, has been assigned the task of estimating a fair acquisition price for the tender offer. Doyle plans to use three different valuation methods to estimate the acquisition price and has collected the necessary financial data for this purpose.

Flueger Systems has 20 million shares outstanding. Doyle has estimated that at the end of each of the next four years, Flueger will have free cash flows (in millions) of \$24, \$27, \$32, and \$36 million. After the fourth year, Doyle expects Flueger's free cash flows to grow at a constant rate of 6% per year. She also determines that Flueger's weighted average cost of capital of 10.5% is the appropriate discount rate to use for the analysis.

Doyle has also found three companies that are in the same industry as Flueger and have a similar capital structure—Behar Corporation, Walters Inc., and Hasselbeck Dynamics. In addition, Doyle has identified data for three takeover transactions with characteristics similar to Flueger—Bullseye, Dart Industries, and Arrow Corp. Data for both sets of firms are shown in the following figure.

<i>Company Statistics</i>	<i>Flueger Systems</i>	<i>Behar Corporation</i>	<i>Walters Inc.</i>	<i>Hasselbeck Dynamics</i>
Current stock price	\$32.00	\$54.00	\$36.50	\$108.20
Earnings per share (EPS) (\$)	1.75	2.80	2.10	6.50
Book value per share (\$)	9.75	17.25	12.10	35.75
Sales per share (\$)	29.75	52.75	37.80	105.00

<i>Company Statistics</i>	<i>Bullseye</i>	<i>Dart Industries</i>	<i>Arrow Corp.</i>
Stock price pre-takeover	\$18.25	\$27.80	\$43.00
Acquisition stock price	\$22.00	\$35.00	\$52.00
Earnings per share (EPS) (\$)	0.95	1.65	2.50
Book value per share (\$)	6.10	9.85	14.20
Sales per share (\$)	17.60	26.75	39.75

Lily Tyler, the CEO of Flueger Systems, was not happy when she heard the rumor that Gretsch Industries may try to take over Flueger in a hostile takeover. Tyler asked two of her executive vice presidents for suggestions on what her firm could do. Jordan Collier said, "If the Gretsch does make a hostile takeover offer, we could implement a fair price amendment to make sure a fair price is offered to our shareholders. Another EVP, Kyle Baldwin stated, "One option is to use a white knight defense and sell a minority stake to a third party that could help block Gretsch from making a deal."

17. The value per share of Flueger stock using the discounted cash flow approach is *closest* to:
  - A. \$27.50.
  - B. \$29.78.
  - C. \$33.02.
18. The average stock price of Flueger Systems under the comparable company approach for the three relative valuation ratios, assuming it is traded at the mean of the three valuations, is *closest* to:
  - A. \$27.50.
  - B. \$30.33.
  - C. \$32.00.
19. Using the comparable company approach, the mean takeover premium and the estimate of the fair acquisition price for Flueger Systems are *closest* to a:
  - A. 22.4% premium and a \$37.12 acquisition price.
  - B. 22.4% premium and a \$40.28 acquisition price.
  - C. 15.6% premium and a \$37.12 acquisition price.
20. The fair acquisition price for Flueger Systems using the comparable transaction approach is *closest* to:
  - A. \$30.33.
  - B. \$32.50.
  - C. \$37.20.
21. Are Collier and Baldwin correct in regard to their suggestions to Tyler about potential courses of action if there is a hostile takeover?
  - A. Both are correct.
  - B. Both are incorrect.
  - C. Only one is correct.

## ANSWERS – CONCEPT CHECKERS

1. **B** Since the two companies will cease to exist in their prior form and a new company will be formed, the form of integration is a consolidation. Also, Uritus Pharmaceuticals, a drug manufacturer, is moving up the supply chain by acquiring Troup Healthcare Systems, a distributor, which is an example of a vertical merger.
2. **B** Achieving more rapid growth by external acquisition, gaining access to unique capabilities, and unlocking hidden value are all potential motivations for mergers. Tax benefits are also a potential motivation for a merger, but the acquirer would want the target to have tax losses, not the other way around.
3. **C** Bootstrapping occurs when the high P/E firm purchases the low P/E firm in exchange for stock. By purchasing the firm with a lower P/E, the acquiring firm is essentially exchanging higher priced shares for lower priced shares. As a result, the number of shares outstanding for the acquiring firm increases, but at a ratio that is less than 1-for-1. When we compute the EPS for the combined firm, the numerator (total earnings) is equal to the sum of the combined firms, but the denominator (total shares outstanding) is less than the sum of the combined firms, resulting in the appearance of EPS growth.
4. **A** A firm with high profit margins that is looking for a conglomerate merger with the goal of gaining access to capital to finance growth is most likely in the rapid growth stage of the industry life cycle.
5. **B** In an asset purchase, payment is made directly to the target company, no shareholder approval is needed (unless the asset sale is more than 50% of the company), the acquirer avoids the assumption of the target's liabilities, and the target is responsible for any capital gains taxes, not the shareholder.
6. **C** Pre-offer merger defense mechanisms are usually easier to defend in court than a post-merger defense mechanisms once a hostile takeover has been announced. Poison pills, restricted voting rights, and supermajority voting provisions are all examples of pre-merger defense mechanisms. The crown jewel defense is a post-merger defense mechanism in which the target tries to sell valuable assets to a neutral third party in order to cause the acquirer to call off the merger.
7. **A** The Hart-Scott-Rodino Antitrust Improvements Act of 1976 required all potential mergers to be reviewed and approved of in advance by the Federal Trade Commission and the U.S. Department of Justice.
8. **B** Pre-merger HHI =  $(0.20 \times 100)^2 + (0.18 \times 100)^2 + (0.12 \times 100)^2 + (0.10 \times 100)^2 + [(0.08 \times 100)^2 \times 5] = 1,288$

$$\text{Post-merger HHI} = (0.20 \times 100)^2 + (0.18 \times 100)^2 + (0.22 \times 100)^2 + [(0.08 \times 100)^2 \times 5] = 1,528$$

$$\text{Change in HHI} = 1,528 - 1,288 = 240$$

The industry the firms operate in is considered moderately concentrated because the post-merger HHI falls between 1,000 and 1,800. With a change in HHI greater than 100, a challenge is possible.

9. **A** Hirauye should agree with both of Klinkenfus's statements. One of the key advantages to using the discounted cash flow method to value a target firm is that it makes it easy to model any changes that may result from operating synergies or changes in cash flow from the merger. One of the key advantages to the comparable transaction approach is that there is no need to compute a separate takeover premium as there is in the comparable company approach.
10. **C** Barton's first statement is correct. Empirical evidence shows that the majority of gains from a merger go to the target: target firm stock prices increased 30% on average, while acquiring firm stock prices declined. Barton's second statement is incorrect. Longer-term studies of post-merger firms show that most have negative stock performance three years after a merger, and they lag their peer group. This indicates that there may be a failure to capture promised synergies from the merger.
11. **C** Both the acquirer and the target are confident about the estimate of merger synergies. In this scenario, Vinova Corporation's shareholders, as the acquirer, would prefer to make a cash offer because it would allow Vinova to keep more of the gain from the merger synergies and limit JJK's gain to the takeover premium. JJK's shareholders would want to share in the rewards as well, so they would prefer to receive a stock offer that would give them ownership in the combined company and enable them to profit from the potential synergies.
12. **A** Statement 1 reflects a carve-out. In a carve-out, a new independent company is created by issuing shares in a public offering of stock. Statement 2 reflects a split-off. Split-offs allow shareholders to receive new shares of a division in exchange for a portion of their shares in the parent company.
13. **B** A declining, low growth division is more likely to be part of a divestiture than a division that is making significant profits as part of a high-growth industry. Other common reasons for making a divestiture include greater access to capital markets, reverse synergy, or lack of profitability.

## ANSWERS – CHALLENGE PROBLEMS

14. **B** The form of integration in this transaction is a statutory merger because Dorman-Gladwell's assets and liabilities will be absorbed by Madura, and Dorman-Gladwell will cease to exist. Since both companies are in the publishing business, this is a horizontal merger.
15. **C** *Gain to target:* Dorman-Gladwell's gain in the merger as the target =  $\text{Gain}_T = \text{TP} = P_T - V_T = (\$56 \times 20) - \$960 = \$160$  million. This represents the takeover premium in the transaction.
16. **B** First, calculate the post-merger value of the combined firm as:

$$V_{AT} = V_A + V_T + S - C$$

where:

$$V_A = \$2,400$$

$$V_T = \$960$$

$$S = \$180$$

$$C = \$0 \text{ because no cash is changing hands}$$

The value of the combined firm is:

$$V_{AT} = \$2,400 + \$960 + \$180 - 0 = \$3,540$$

Next, to account for dilution and find the price per share of the combined firm, divide the post-merger value by the post-merger shares outstanding. Since the exchange ratio is 0.7, Madura will need to issue 14 million new shares to acquire the 20 million shares of Dorman-Gladwell. Adding 14 million new shares to the 30 million shares of Madura already outstanding means the post-merger shares outstanding is 44 million.

$$P_{AT} = \frac{\$3,540}{44} = \$80.45$$

This means that the actual value of each share given to Dorman-Gladwell's shareholders is \$80.45, and that the actual price paid for the target is:

$$P_T = (N \times P_{AT}) = (14 \times \$80.45) = \$1,126.3 \text{ million}$$

Madura Publishing's gain in the merger as the acquirer is:

$$\text{Gain}_A = S - \text{TP} = S - (P_T - V_T) = \$180 - (\$1,126.3 - \$960) = \$13.7 \text{ million}$$

$$17. \text{ C} \quad \text{Discounted FCF} = \frac{\$24}{1.105} + \frac{\$27}{1.105^2} + \frac{\$32}{1.105^3} + \frac{\$36}{1.105^4} = \$91.69 \text{ million}$$

$$\text{Terminal value}_4 = \frac{\text{FCFF}_4(1+g)}{(\text{WACC}_{\text{adjusted}} - g)} = \frac{\$36(1+0.06)}{(0.105 - 0.06)} = \$848.0 \text{ million}$$

$$\text{Terminal value}_0 = \frac{\$848.0}{1.105^4} = \$568.78 \text{ million}$$

$$\text{Estimated value for Flueger} = (\$91.69 \text{ million} + \$568.78 \text{ million}) / 20 \text{ million shares} \\ = \$33.02$$

18. B The calculation for the relative value valuation is shown in the following figures:

<i>Company Statistics</i>	<i>Behar Corporation</i>	<i>Walters Inc.</i>	<i>Hasselbeck Dynamics</i>	<i>Mean</i>
Current stock price	\$54.00	\$36.50	\$108.20	
P/E Ratio	\$54.00 / 2.80 = 19.29	\$36.50 / 2.10 = 17.38	\$108.20 / 6.50 = 16.65	17.77
P/B Ratio	\$54.00 / 17.25 = 3.13	\$36.50 / 12.10 = 3.02	\$108.20 / 35.75 = 3.03	3.06
P/S Ratio	\$54.00 / 52.75 = 1.02	\$36.50 / 37.80 = 0.97	\$108.20 / 105.00 = 1.03	1.01

<i>Company Statistics</i>	<i>Mean</i>	<i>Flueger Systems Statistics</i>	<i>Flueger Systems Valuation</i>
P/E Ratio	17.77	1.75	\$31.10
P/B Ratio	3.06	9.75	\$29.84
P/S Ratio	1.01	29.75	\$30.05
<b>Mean value for Flueger Systems using comparable firms: \$30.33</b>			

19. A The calculation for the mean takeover premium is:

<i>Company Statistics</i>	<i>Bullseye</i>	<i>Dart Industries</i>	<i>Arrow Corp.</i>	<i>Mean Takeover Premium</i>
Stock price pre-takeover	\$18.25	\$27.80	\$43.00	
Acquisition stock price	\$22.00	\$35.00	\$52.00	
Takeover premium = (DP – SP) / SP	20.5%	25.9%	20.9%	22.4%

Applying this value to the mean comparable company valuation calculated in Question 18 gives us:  $\$30.33 \times 1.224 = \$37.12$ .



20. **C** The calculation for the fair acquisition price under the comparable transaction approach is shown in the following figures:

<i>Company Statistics</i>	<i>Bullseye</i>	<i>Dart Industries</i>	<i>Arrow Corp.</i>	<i>Mean</i>
Takeover price	\$22.00	\$35.00	\$52.00	
P/E Ratio	$\$22.00 / 0.95 = 23.16$	$\$35.00 / 1.65 = 21.21$	$\$52.00 / 2.50 = 20.80$	21.72
P/B Ratio	$\$22.00 / 6.10 = 3.61$	$\$35.00 / 9.85 = 3.55$	$\$52.00 / 14.20 = 3.66$	3.61
P/S Ratio	$\$22.00 / 17.60 = 1.25$	$\$35.00 / 26.75 = 1.31$	$\$52.00 / 39.75 = 1.31$	1.29

<i>Company Statistics</i>	<i>Mean</i>	<i>Flueger Systems Statistics</i>	<i>Flueger Systems Valuation</i>
P/E Ratio	21.72	1.75	\$38.01
P/B Ratio	3.61	9.75	\$35.20
P/S Ratio	1.29	29.75	\$38.38
Fair acquisition value using the comparable transaction approach: \$37.20			

21. **B** Both Collier's statement and Baldwin's statement are incorrect. Collier suggests using a fair price amendment after the takeover is announced; however, a fair price amendment is a pre-offer defense, not a post-offer defense. Baldwin's statement is incorrect because he is actually describing a white squire defense, not a white knight defense.

## SELF-TEST: CORPORATE FINANCE

Use the following information for Questions 1 through 6.

The CEO of Edgington Enterprises, Nicole Johnson, is conferring with her finance staff regarding the plans for capital projects during the upcoming year. Like most firms, Edgington is capital constrained, and Johnson wants to make the most out of what is available. During the meeting, several issues are raised.

While inflation has recently been low, some evidence is present in the commodities markets to suggest that it could become a concern during the life of even a medium-term project. Johnson knows that inflation can have a significant impact on project selection. The staff is asked how an increase in the rate of inflation might affect the capital budgeting process.

The following data pertains to two capital projects currently under consideration. The cost of both projects is \$30,000,000.

	<i>Net Present Value</i>	<i>Life in Years</i>
Project Andover	\$35,000,000	8
Project Baltimore	\$25,000,000	5

Johnson informs the staff that it appears that the firm will have only \$30,000,000 available for investment during the upcoming year, so a choice will have to be made. The finance staff estimates that the firm's after-tax WACC is 7.5%.

In recent months, there has been a vigorous discussion in the financial press about the need to manage risk. During this past November, Johnson attended a 3-day seminar on risk management at the University of Chicago. One of the key points made by seminar faculty was that reducing risk, even if there is a cost incurred to do so, can increase firm value. Johnson has asked the finance team how project risk is evaluated, and what type of risk is being measured during the capital budgeting process.

Another key point made during the seminar was that some projects are not well evaluated with traditional capital budgeting methods, such as NPV. These are projects that require management to make critical decisions after the commitment to undertake the project has been made, and at least part of the project's capital has been invested. She wonders if the finance staff is familiar with the evaluation of such projects.

As the meeting was coming to a close, Marques Wilson, CFA, suggested to the staff that it may be useful to try to connect project performance with incremental changes in firm value. To this end, he suggests that it may be useful to attempt to measure a project's economic profits. These can be used to infer how the project is affecting overall firm value.

Johnson charged the staff with giving consideration to the matters raised during the meeting before they reconvene at the end of the week.

After work, Johnson heads out to teach a CFA review course for her local society. The topic for that evening coincides with her work in corporate finance, but focuses more on mergers and acquisitions. She presents the class with the following case study:

Toulouse Tempered Steel Industries (TTS) is weighing its strategic options following a wave of mergers in the industry across Europe and worldwide. Pascal LaPage, managing director of TTS is wondering whether it makes sense for the firm to position itself as a standalone entity, or if the firm should be pursuing a merger/acquisition of another firm that would provide a good strategic fit. Lyon Bank has been the firm's primary lender for many years, and Alain Clamon, CFA, from Lyon's corporate finance department is due to meet with LaPage and other members of the firm's finance group to discuss some strategic options.

Clamon begins his presentation with the underlying rationale for even considering a merger or acquisition as a strategic alternative. Some reasons cited by Clamon that can be used to justify a merger are the pursuit of economies of scale, the elimination of operating inefficiencies, and diversification of the firm's assets. In general, the underlying rationale helps to determine what type of merger the firm will be undertaking. LaPage asks his staff to keep these in mind as they seek suitable candidates for evaluation.

LaPage's team has already identified two firms that might be good acquisition candidates for TTS. One is Aragon Metals, and the other is Brittany Engineered Products. A member of the staff asks Clamon about types of takeover defenses that might be employed by either Aragon or Brittany. Clamon replies that these fall broadly into two categories: pre-offer and post-offer defenses. As examples of pre-offer defenses, he describes staggered boards and supermajority voting provisions. As an example of post-offer defenses, he describes asset restructuring. He notes that, obviously, TTS must take care to account for the ramifications of the presence of any takeover defenses.

1. The three categories of cash flows that are typically associated with a capital project are:
  - A. financing, operating, and terminal year.
  - B. initial investment outlay, operating, and financing.
  - C. initial investment outlay, operating, and terminal year.
2. Suppose that there are two scenarios for projects Andover and Baltimore. Under Scenario 1, the projects cannot be replicated, while under Scenario 2, the projects can be replicated. Which project should be accepted?
 

<u>Scenario 1</u>	<u>Scenario 2</u>
A. Andover	Baltimore
B. Andover	Andover
C. Baltimore	Andover
3. When the value of a given project is contingent upon future decisions of management, the project can be *best* described as containing:
  - A. real options.
  - B. flexibility options.
  - C. timing options.

4. Suppose that the firm has a project code named Richmond. The dollar amount of the investment in Richmond is \$40 million. Last year, Richmond's EBIT was \$6 million. If the relevant tax rate is 35%, what was Richmond's economic profit during the past year?
  - A. \$900,000.
  - B. \$3,900,000.
  - C. \$2,100,000.
5. With regard to the list of sensible motives for undertaking a merger cited by Clamon in Johnson's case study, he is:
  - A. correct with regard to operating inefficiencies, and correct with regard to diversification.
  - B. correct with regard to operating inefficiencies, but incorrect with regard to diversification.
  - C. incorrect with regard to operating inefficiencies, but correct with regard to diversification.
6. With respect to the takeover defenses described by Clamon, he is:
  - A. incorrect with regard to the pre-offer defenses listed, and incorrect with regard to the post-offer defense listed.
  - B. incorrect with regard to the pre-offer defenses listed, but correct with regard to the post-offer defense listed.
  - C. correct with regard to the pre-offer defenses listed, and correct with regard to the post-offer defense listed.

## SELF-TEST ANSWERS: CORPORATE FINANCE

1. C The three typical categories regarding capital project cash flows are initial investment outlay, operating, and terminal year.
2. A If the projects cannot be replicated, then the project with the greatest NPV should be selected, and this is Andover. If the projects can be replicated, we can evaluate the projects using either a least common lives approach or an equivalent annual annuity approach. The least common multiple of the projects' lives is 40 years, and the replacement chain NPVs are \$75.25 million for Andover and \$77.83 million for Baltimore. The equivalent annual annuity values are \$5.975 million for Andover and \$6.179 million for Baltimore. Both methods indicate that Baltimore should be chosen if the projects can be replicated.
3. A When a project's value is a function of managerial decisions that must be made in periods following the investment, the project is said to contain real options. The other answers are simply types of real options that may be present in a project.
4. A The economic profit is calculated as:  
  

$$EP = NOPAT - \$WACC = \$6(1 - 0.35) - \$40(0.075) = \$0.9 \text{ million}$$
5. B Pursuing a merger where the underlying rationale is to eliminate operating inefficiencies is generally considered sensible. A merger in pursuit of diversification is generally not seen as sensible, since it is ordinarily much more cost-effective for shareholders to diversify on their own.
6. C In both cases, Clamon has correctly provided examples of pre-offer and post-offer takeover defenses.

# FORMULAS

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## STUDY SESSIONS 5, 6, AND 7: FINANCIAL REPORTING AND ANALYSIS

**ending inventory** = beginning inventory + purchases – COGS

**FIFO inventory** = LIFO inventory + LIFO reserve

**FIFO COGS** = LIFO COGS – (ending LIFO reserve – beginning LIFO reserve)

**funded status of the plan:** funded status = fair value of plan assets – PBO

**average age** =  $\frac{\text{accumulated depreciation}}{\text{depreciation expense}}$

**average depreciable life** =  $\frac{\text{ending gross investment}}{\text{depreciation expense}}$

**remaining useful life** =  $\frac{\text{ending net investment}}{\text{depreciation expense}}$

**net pension expense summary:**

Current service cost  
+ Interest cost  
– Expected return on assets  
± Amortization of deferred (gains) and losses  
+ Amortization of past service cost  
= Net pension expense



*Professor's Note: Not all of these ratios are used in this book. However, this list includes most of the common ratios that you are likely to encounter on exam day.*

**current ratio** =  $\frac{\text{current assets}}{\text{current liabilities}}$

**quick ratio** =  $\frac{\text{cash} + \text{marketable securities} + \text{receivables}}{\text{current liabilities}}$

**cash ratio** =  $\frac{\text{cash} + \text{short-term marketable securities}}{\text{current liabilities}}$

$$\text{receivables turnover} = \frac{\text{net annual sales}}{\text{average receivables}}$$

$$\text{average receivable collection period} = \frac{365}{\text{receivables turnover}}$$

$$\text{inventory turnover} = \frac{\text{cost of goods sold}}{\text{average inventory}}$$

$$\text{average inventory processing period} = \frac{365}{\text{inventory turnover}}$$

$$\text{payables turnover} = \frac{\text{purchases}}{\text{average payables}}$$

$$\text{average payables payment period} = \frac{365}{\text{payables turnover}}$$

$$\text{total asset turnover} = \frac{\text{net sales}}{\text{average total net assets}}$$

$$\text{fixed asset turnover} = \frac{\text{net sales}}{\text{average net fixed assets}}$$

$$\text{equity turnover} = \frac{\text{net sales}}{\text{average equity}}$$

## STUDY SESSIONS 8 AND 9: CORPORATE FINANCE

$$\text{outlay} = \text{FCInv} + \text{NWCInv}$$

$$\begin{aligned}\text{after-tax operating cash flow (CF)} &= (S - C - D)(1 - T) + D \\ &= (S - C)(1 - T) + (TD)\end{aligned}$$

$$\text{TNOCF} = \text{Sal}_T + \text{NWCInv} - T (\text{Sal}_T - B_T)$$

$$\text{economic income} = \text{cash flow} + (\text{ending market value} - \text{beginning market value})$$

or

$$\text{economic income} = \text{cash flow} - \text{economic depreciation}$$

**economic profit:**  $EP = NOPAT - \$WACC$

**market value added:**  $NPV = MVA = \sum_{t=1}^{\infty} \frac{EP_t}{(1 + WACC)^t}$

**residual income** = net income – equity charge

**project cost of equity** =  $R_F + \beta_{\text{project}} [E(R_{MKT}) - R_F]$

**weighted average cost of capital:**  $WACC = \left[ r_d \times (1 - t) \left( \frac{\text{debt}}{\text{assets}} \right) \right] + \left[ r_e \times \left( \frac{\text{equity}}{\text{assets}} \right) \right]$

**MM Proposition I (no taxes):**  $V_L = V_U$

**MM Proposition II (no taxes):**  $r_e = r_0 + \frac{D}{E}(r_0 - r_d)$

**MM Proposition I (with taxes):**  $V_L = V_U + (t \times d)$

**MM Proposition II (with taxes):**  $r_e = r_0 + \frac{D}{E}(r_0 - r_d)(1 - T_c)$

**static trade-off theory:**  $V_L = V_U + (t \times d) - PV(\text{costs of financial distress})$

**change in price when stock goes ex-dividend:**  $\Delta P = \frac{D(1 - T_D)}{(1 - T_{CG})}$

**effective tax rate** = corporate tax rate + (1 – corporate tax rate)(individual tax rate)

**expected dividend** =  $\left( \text{previous dividend} \right) + \left[ \left( \frac{\text{expected increase in EPS}}{\text{target payout ratio}} \right) \times \left( \frac{\text{adjustment factor}}{\text{ratio}} \right) \right]$

**FCFE coverage ratio** = FCFE / (dividends + share repurchases)



**Herfindahl-Hirschman Index:** 
$$HHI = \sum_{i=1}^n (MS_i \times 100)^2$$

**free cash flow:** 
$$\begin{aligned} &\text{Net income} \\ &+ \text{Net interest after tax} \\ &= \text{Unlevered net income} \\ &\pm \text{Change in deferred taxes} \\ &= \text{Net operating profit less adjusted taxes (NOPLAT)} \\ &+ \text{Net noncash charges} \\ &\pm \text{Change in net working capital} \\ &- \text{Capital expenditures (capex)} \\ &= \text{Free cash flow (FCF)} \end{aligned}$$

**terminal value:** 
$$TV_T = \frac{FCF_T (1 + g)}{(WACC_{\text{adjusted}} - g)}$$

or

$$TV_T = FCFT \times (P / FCF)$$

**takeover premium:** 
$$TP = \frac{DP - SP}{SP}$$

**post-merger value of an acquirer:** 
$$V_{AT} = V_A + V_T + S - C$$

**gain to target:** 
$$\text{Gain}_T = TP = P_T - V_T$$

**gain to acquirer:** 
$$\text{Gain}_A = S - TP = S - (P_T - V_T)$$

**price of target in stock deal:** 
$$P_T = (N \times P_{AT})$$

**gross profit margin** 
$$= \frac{\text{gross profit}}{\text{net sales}}$$

**operating profit margin** 
$$= \frac{\text{operating profit}}{\text{net sales}} = \frac{\text{EBIT}}{\text{net sales}}$$

**net profit margin** 
$$= \frac{\text{net income}}{\text{net sales}}$$

$$\text{return on assets} = \frac{\text{net income}}{\text{average total assets}}$$

$$\text{return on total invested capital ratio} = \frac{\text{net income} + \text{interest expense}}{\text{interest bearing debt} + \text{shareholders' equity}}$$

$$\text{return on total equity} = \frac{\text{net income}}{\text{average total equity}}$$

$$\text{interest burden rate} = \frac{\text{interest expense}}{\text{total assets}}$$

$$\text{tax retention rate} = 1 - \left( \frac{\text{dividends declared}}{\text{operating income after taxes}} \right)$$

$$\text{financial leverage ratio} = \frac{\text{total assets}}{\text{total equity}}$$

$$\text{long-term debt-to-equity ratio} = \frac{\text{total long-term debt}}{\text{total equity}}$$

$$\text{debt - to - equity ratio} = \frac{\text{total debt}}{\text{total equity}}$$

$$\text{debt - to - capital ratio} = \frac{\text{short-term debt} + \text{long-term debt}}{\text{short-term debt} + \text{long-term debt} + \text{total equity}}$$

$$\text{interest coverage} = \frac{\text{EBIT}}{\text{interest expense}}$$

$$\text{payout ratio} = \frac{\text{dividends paid}}{\text{net income}}$$

$$\text{retention ratio} = 1 - \text{payout ratio}$$

$$\text{earnings per share} = \frac{\text{net income} - \text{preferred dividends}}{\text{average common shares outstanding}}$$

$$\text{book value per share} = \frac{\text{common stockholders' equity}}{\text{total number of common shares outstanding}}$$

$$\text{balance sheet based accruals ratio} = \frac{(\text{NOA}_{\text{END}} - \text{NOA}_{\text{BEG}})}{(\text{NOA}_{\text{END}} + \text{NOA}_{\text{BEG}}) / 2}$$

$$\text{cash flow based accruals ratio} = \frac{(\text{NI} - \text{CFO} - \text{CFI})}{(\text{NOA}_{\text{END}} + \text{NOA}_{\text{BEG}}) / 2}$$

$$\text{core operating margin} = \frac{\text{sales} - \text{COGS} - \text{SG\&A}}{\text{sales}}$$

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